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I.—*An Examination of the Páli Buddhistical Annals, No. 5. By the Hon.* GEORGE TURNOUR, *Esq. Ceylon Civil Service.*

Having in the papers No. 3, and No. 4, given the lineage, as well as the account of the birth, of GOTAMO BUDDHO, as contained in these Buddhistical records, I now send you an analysis of the *Parinibbána-suttan*, which is the history of his final extinction, or death. It is the third *Suttan* of the *Maháwaggo* in the *Díghanikáyo* of the *Sutta-piṭako*. It consists of six *Bhánawárá;* and commences with the words "the following was heard by myself," being the introductory expression used by A'NANDO at the FIRST CONVOCATION, in propounding each of the *Suttáni* of the *Suttapiṭako* in that assembly.

This *Suttan* is perhaps the most interesting section in the *Piṭakattayan*. The fame of SÁKYA had, at the period of his death, been to a certain extent established; and the creed of that wonderful impostor had been then recognized in the central regions, at least, of India. It is justifiable therefore to infer, that a considerable portion of the incidents recorded, as far as they could be produced by human imposture, practised among a superstitious and credulous Asiatic population, actually took place. Whereas at the period of his birth, and even up to the time of his secession from a secular and domestic existence, the circle must have been restricted almost to his own family, within which alone the delusion of his predicted Buddhohood could have been fostered, and its pretended realization been recognized. No external co-operation, therefore, of a deluded populace could have been enlisted on an extended scale, till a more advanced stage of his pilgrimage. The account of the birth of BUDDHO given in the paper No. 3, must consequently, as regards its narrative of the superstitious enthusiasm

then prevalent, partake more largely of a fictitious character, than this narrative of his death does. I have given a literal translation of the most interesting passages, and a continuous precis of the rest of the *Suttan*, adding a note from Buddhaghóso's *Aṭṭhakathá*, wherever it afforded the means of throwing additional light on the narrative of the text.

This is, I fear, my last contribution to your Journal. In a few days I leave *Kandy* for *Colombo*. The duties of my new office, and my separation from the Buddhist pandits, and their libraries at this place, will prevent, for some time at least, the further prosecution of this examination.

Kandy, October 18, 1838.

The Mahápariníbbána Suttan. The first Bhánawáro.

The following was heard by myself. At a certain period, while Bhagawa' was dwelling at the *Gijjhakaṭó* mountain, near *Rájagahan*, the *Mágadha* rája, Aja'tasattu, a descendant of the *Wédéhi* line, was meditating the subjugation of *Wajji* (confederation)*.

Thereupon the said *Mágadha* monarch Aja'tasattu, the descendant of the *Wédéhi* princes, sent for the brahman Wassaka'ro, who was the prime minister of *Mágadha*, and said: I must utterly annihilate these *Wajjians*, who are thus great (by their union among themselves), and powerful (by the efficiency of their martial institutions): I will destroy these *Wajjians:* I will utterly exterminate these *Wajjians*. Brahman, come hither. Wherever Bhagawa' may be, thither proceed; and having found him, bow down with lowly reverence at the feet of Bhagawa', on my behalf, and inquire whether, free from ailment and disquietude, he is in the enjoyment of his energies and health. Moreover thus address him. Lord! the *Mágadha* rája Aja'tasattu, the descendant of the *Wédéhi* line, has commanded me saying; bow down in lowly reverence at the feet of Bhagawa', and inquire whether, free from ailment and disquietude, he is in the enjoyment of his energies and health. Lord! the said *Mágadha* rája Aja'tasattu, the descendant of the *Wédéhi* line, in his anxiety to subjugate the *Wajjians*, has vowed,—I must annihilate these *Wajjians*, who are thus great and powerful. I will destroy these *Wajjians:* I will utterly extirpate these *Wajjians*. Whatever Bhagawa' may vouchsafe to reply, carefully retaining the same in thy mind, impart it to me: the Tathágathá never spake an untruth.

The brahman Wassakaro, the prime minister of *Mágadha*, having attentively listened to the *Mágadha* rája Aja'tasattu, the descendant of the *Wédéhi* line, replied: Be it so, lord! and preparing superb conveyances, and mounting a magnificent vehicle, surrounded by these superb conveyances, he departed from *Rájagahán*.

Wheresoever the *Gijjhakúṭo* mountain might be, thither he proceeded. Having gone in his vehicle as far as he should go in a vehicle, then descending from his conveyance, he approached the place where Bhagawa' was. Having approached him; he made his salutation to Bhagawa'. The prescribed salutations having been made; and having carefully called to his recollection all that he ought to have borne in mind, he seated himself on one side of him.

* These rájas or rulers were of the *Lichchhawi* dynasty; the capital of whose dominions called *Wajji*, was *Wésáli (Allahabad)*. The union of the *Waïjian* states is stated to have consisted of a confederation of chiefs, or princes.

The brahman WASSAKARO, the prime minister of *Mágadha*, who had thus seated himself aside, addressed BHAGAWA' as follows: Lord, GOTAMO, the *Mágadha* rája AJA'TASATTU of *Wédéhi* descent, bows down reverentially at the feet of the Lord GOTAMO, and inquires whether, free from ailment and disquietude, he is in the enjoyment of his energies and health. The *Mágadha* rája, AJA'TASATTU of *Wédéhian* descent, in his desire to subjugate the *Wajji* rulers, has thus vowed: I will annihilate these great and powerful *Wajjians*: I will destroy these *Wajjians*. On this occasion, the venerable A'NANDO was standing behind BHAGAWA', fanning him.

Then BHAGAWA' thus inquired of the revered ANANDO'. Hast thou heard, A'NANDO, that the *Wajjians* are frequently holding meetings, and that they are assembling in great numbers? Yes, Lord, I have heard that the *Wajjians* are frequently holding meetings, and that they are constantly assembling in great numbers. A'NANDO, as long as these frequent risings, and constant assemblings are kept up among the *Wajjians*, their schemes will be advanced. They will not be checked.

Hast thou heard A'NANDO, that the *Wajjians* are meeting in concert, and rising in concert, and that they are in concert making the requisite preparation? Lord! I have heard, &c.* A'NANDO as long as the *Wajjians* are rising in concert, are holding meetings in concert, and are making their requisite preparations in concert, so long will the objects they have in view be advanced. They will not be checked.

A'NANDO hast thou heard that the *Wajjians* are refraining from adopting that which had no (previous) existence; that they are abstaining from abolishing that which had been (formerly) established; and that they are adhering to the *Wajjian* institutions which were anciently constituted, upholding them? Lord! I have heard, &c. A'NANDO as long as the *Wajjians* shall abstain from adopting that which did not previously exist; from abolishing that which had been established, and shall adhere to whatever *Wajjian* institutions may have been anciently constituted, upholding them, the schemes of the *Wajjians*, A'NANDO, must advance, and cannot retrograde.

Hast thou heard A'NANDO that whatever number there may be among the *Wajjians*† of *Wajjian* elders, these *Wajjians* support, respect, reverence and obey them, conforming to what they hear from them? Lord! I have heard, &c. A'NANDO, as long as these *Wajjians* shall support, respect, reverence, obey and conform to what they hear from the elders among the *Wajjians*, the projects of the *Wajjians* must advance, and cannot be disappointed.

* Every answer is an affirmative repetition of the question.

† On this point, the *Aṭṭhakathá* contains this note.

In aforetime, the *Wajjian* rulers, on a person being brought and presented to them, thus charged "this is a malefactor" without at once deciding "he is a malefactor, dispose of him accordingly." They surrender him to the *Winichchhiya-mahámattá* (chief judicial officers). Having examined him, if they conceive "this man is not a culprit," they release him. If they decide, "this is a malefactor" without awarding any penalty, they transfer him to the *Wóhárikú* (learned in the customs or laws). They also having investigated the matter, discharge him, if he be innocent; but if he be guilty, there are certain officers called *Suttadhari** (maintainers of the *suttan*) to whom they transfer him. They also inquire into the matter and discharge him, if he be innocent; but if guilty, they transfer him to the *Aṭṭhakúlaká*†. They also having observed the same procedure, transfer him to the

* Vide Journal of 1837, for a definition of the word *Suttan*.

† Literally "the eight castes or tribes." I can obtain no satisfactory explanation of the nature of the office held by these functionaries. It is inferred to be, a judicial institution composed of judges from all the eight castes.

Hast thou heard, A'NANDO, that the *Wajjians* do not submit to have their wives and damsels of respectable families forcibly taken (by their rulers)? Lord! I have heard, &c. A'NANDO! as long as the *Wajjians* shall not submit to have their wives and damsels of respectable families forcibly taken (by their rulers), the designs of the *Wajjians* must prosper, and cannot miscarry.

A'NANDO! hast thou heard that the *Wajjians*, whatever the number may be of the *Wajjian chétiyani** belonging to the *Wajjian* (rulers), whether situated within or without (the city), they maintain, respect, reverence and make offerings to them, and that they keep up without diminution the ancient offerings, the ancient observances, and the ancient sacrifices righteously made? Lord! I have heard, &c. A'NANDO, as long as the *Wajjians*, &c.

A'NANDO hast thou heard that to the *Arahantá* of the *Wajjians*, protection, security, and safety are most righteously provided, in order that the *Arahantá* who have absented themselves from their country might return; and in order that those who have returned to their country, may conveniently dwell there. Lord! I have heard, &c. A'NANDO as long as the *Wajjians*, &c.

Thereupon BHAGAWA' thus addressed the brahman WASSAKARO, the prime minister of *Mághada*: Brahman, at the time when I was dwelling at the *Sárandado Chétiyo*, in *Wésáli*, I propounded these seven imperishable precepts unto the *Wajjians* resident there. Brahman, as long as these seven imperishable precepts shall be maintained, and the *Wajjians* shall be observant of these seven imperishable precepts, the projects of the *Wajjians* must prosper, and cannot miscarry.

On being thus addressed, WASSAKARO, the brahman prime minister, replied: Lord GÓTAMÓ, if the projects of the *Wajjians* must prosper, and cannot miscarry by their observance of any one of these imperishable precepts, who can define the measure of their success, when they are observant of all the seven imperishable precepts. Lord GÓTAMÓ, consequently it only remains for the *Mágadha* monarch, AJA'TASATTU, the descendant of the *Wédéhián* line. either to propitiate by tributes, or to dissolve the compact which unites (these *Wajji* rulers), without engaging in war. Lord GÓTAMÓ, as we have important and indispensible duties to perform, we must therefore depart. Brahman, consult thy own convenience in that respect.

Thereupon WASSAKARO, the brahman prime minister of *Mágadha*, greatly delighted at the discourse of BHAGAWA', and receiving his blessing, rising from his seat, departed†.

Sénápati (chief minister), he again to the *Uparájá* (sub-king); the *Uparájá* to the rája. The rája, inquiring into the matter, if he be innocent, releases him, but if he be guilty, he causes the *Pawénipatthakán* (book of precedents or usages) to be propounded. There it is written, to him by whom such a crime is committed, such a punishment is awarded. The rája having measured the culprit's offence by that standard, pronounces a suitable sentence.

* The *Aṭṭhakathá* explains that *chétiyáni* are not Buddhistical shrines but *Yakkhaṭṭhánáni* (edifices belonging to the *Yakkha* or demon worship); and yet the religion of BUDDHO had been established in *Wajji* at this period.

† The *Aṭṭhakathá* gives the following particulars of the proceedings adopted by AJA'TASATTU, on the return of WASSAKA'RO to *Rajágahan*, which is omitted in the *Suttán*.

WASSAKA'RO returned to the rája; and the monarch inquired—*Achériyo*, what says BHAGAWA? He, repeating the declaration of the ascetic GOTAMO, said: By no other means will the *Wajjians* be overcome but by propitiating with tribute, or dissolving the subsisting union. The rája replied: by propitiating with tributes our elephants and horses will be diminished; we must get the better of them by breaking

Immediately after the departure of WASSAKARO the brahman prime minister of *Mágadha*, BHAGAWA', thus addressed the revered A'NANDO:—A'NANDO, depart; whatever the number of bhikkhus may be who are maintained for the welfare of *Rájaga-*

up their union: what shall we do? Maharája, in that case, raise some discussion in reference to the *Wajjians* in the midst of your counsellors. Thereupon I shall observe to you: *Maharája*, what do you want with them? Let them occupy themselves with the agricultural and commercial affairs of their own (realm). Having offered this remonstrance I shall quit (the council). Thereupon you should say: what does this brahman mean by interdicting our discussion regarding the *Wajjians*. In the forenoon of that day I shall send off some tribute to the *Wajjians*. Contriving to intercept that, and bringing a charge against me, without either binding or flogging me, completely cut off all my hair. As I am the person by whom the ramparts and ditches of thy capital were formed, and as I know the strong and weak, the high and low parts (of thy fortifications), I will tell (the *Wajjians*) that I am able to remove any obstacle you can raise. On your hearing that this scheme (has been adopted by them): say, let them come. All this the rája acted up to.

The *Wajjians* hearing of his (WASSAKA'RO'S) departure (for *Wésáli*) some decided thus: if the brahman come, he should not be permitted to cross the river. Others again observed: he (AJA'TASATTU) has so treated him, because he advocated our cause. That being the case, they said (to the guards who went to stop him): fellows let him come. He proceeded on, and being asked by the *Wajjians* for what misconduct he had been so treated, he explained what had been preconcerted. After observing it was most unjust that he should be so severely punished for so slight an offence they inquired: what office hadst thou there? He replied: I was there judicial minister. They rejoined: let the same office be filled by thee here. He most ably administered justice: and the youths of the (*Wajji*) rulers attended him, to acquire their accomplishments.

He who had thus acquired the reputation of a virtuous character, on a certain day taking aside one of the *Lichchhawi* rulers (mysteriously) asked: do people plough a field? Yes, they do. By coupling a pair of bullocks together? Yes, by coupling a pair of bullocks together. Another (of the *Lichchhawi* rulers) having inquired: what is it the *Achériyo* has mysteriously been saying? and on its being explained to him, incredulous, he remarked: he will not confide the truth to me; and quarrelled with that person. The brahman, upon another occasion taking another *Lichchhawi* aside significantly asked: with what curry did you eat (your rice)? and said no more. Another having been told what was said; also incredulous, similarly quarrelled with that person. The brahman upon a subsequent occasion, taking another *Lichchhawi* aside, asked him in a whisper—art thou a mere beggar? He inquired: who has said so? and the brahman replied: that *Lichchhawi*. Again upon another occasion, taking another aside he inquired: Art thou a coward? and on being asked who said so? he mentioned the name of some other *Lichchhawi*. Thus by telling to one person that which no other person had ever said, in the course of three years, he so completely disunited these rulers, one from another, that no two of them would walk the same road together.

When matters had been brought into this state, he caused the tocsin to be sounded as usual. The *Lichchhawi* rulers disregarded the call saying: let the *rich* and the *valiant* assemble: (we are the *beggars* and *cowards*.) The brahman sent a mission to his rája, saying: this is the proper time, let him come quickly. The rája, on hearing this announcement, assembled his forces by the beat of drums, and set out. The *Wésálians* on receiving intimation thereof, beat the tocsin, proclaiming: let us not allow the rája to cross the river. On hearing this call also, they refused

han assemble them all at the *Upaṭṭhána** hall. The revered A'NANDO having replied: Be it so, lord; and received this command of BHAGAWA', whatever the number of bhikkhus might he who were maintained for the spiritual welfare of *Rájagahan*, having assemhled them all in the *Upaṭṭhánan* hall, wherever BHAGAWA' might be, thither he returned.

Having approached and bowed down to BHAGAWA' he stationed himself on one side of him. The revered A'NANDO, who had thus placed himself on one side, thus explained himself to BHAGAWA': Lord! the priesthood are assembled: Lord BHAGAWA', thou knowest whether this be the fitting time. Thereupon, BHAGAWA', arising from his seat, wheresoever the *Upaṭṭhána* hall might he, thither he repaired. Having arrived there, he seated himself on the throne prepared for him.

The enthroned BHAGAWA' thus addressed the hhikkhus; Bhikkhus, I will propound unto you the seven imperishable precepts: listen and unreservedly incline your minds thereto: I will now address you. The said hhikkhus replied, saying: Be it so Lord. BHAGAWA' then thus spoke.

Bhikkhus, as long as the priests meet frequently (for religious observances); and assemhle in great numbers, the designs of the priests must prosper, and cannot be defeated.

Bhikkhus, as long as the priests shall hold these meetings, simultaneously, rise from them, simultaneously and unanimously discharge their sacerdotal duties, the designs of the priests must prosper, and cannot fail.

Bhikkhus, as long as the priests shall abstain from establishing that which has not been prescribed; from abrogating that which has been estahlished; and shall, accepting the precepts (of Buddhism) as they are laid down, inculcate and maiutaiu these, the designs of the priests must prosper, and cannot be defeated.

Bhikkhus, as long as the priests shall support, reverence, respect and obey those bhikkhus who are the elders of the priesthood, of great experience, venerable hy their ordination, fathers of their fraternity, and chiefs of the sacerdotal hody; and shall learn from them that which ought to he acquired, the designs of the priests must prosper, and cannot miscarry.

Bhikkhus, as long as the priests overcome the desires which engender the wish for regeneration in another existence, the designs of the priests must prosper, and cannot miscarry.

Bhikkhus, as long as the priests delight to dwell in wildernesses (removed from the distractions of laical connection) the designs of the priesthood must prosper, and cannot miscarry.

Bhikkhus, as long as the priests shall keep their minds embued with pious aspirations, saying to themselves: may pious conforming teachers who have not already presented themselves yet appear; and may those pious conforming teachers who have already come dwell in peace among us, the designs of the priests must prosper and cannot fail.

Bhikkhus, as long as these seven imperishable precepts shall he maintained among the priesthood; and as long as the observance of these seven imperishahle precepts shall continue manifested, the designs of the priesthood must prosper, and cannot fail.

to assemhle, saying: let the *valiant* rulers go. Again the tocsin sounded, and proclamation was made: let us not allow them to enter the city: let us defend ourselves with closed gates. Not one answered the call. (AJA'TASATTU) entering by the wide open gates, and having subjected them all to great calamities, returned.

* *Upaṭṭhánan* is the hall or apartment in which BUDDHO has been accommodated in any wihára. The hall here spoken of is an edifice at the *Giddhakúṭo* mountain, where BUDDHO was then dwelling. *Giddhakúṭo* is one of the hills that environ *Rájagahan*; the other four are *Isigili*, *Webhára*, *Wepullo*, and *Pandawo*.

In the same form of words BHAGAWA' proceeds to propound a second series of seven imperishable precepts, which are in substance—

1. As long as the priests, neither unduly longing for, nor addicted to, gratifications (in themselves allowable), shall abstain from excessive indulgence in them.

2. As long as the priests neither longing for, nor addicted to, idle talk, shall abstain from unprofitable gossip.

3. As long as the priests neither wishing for, or addicted to, an indolent (sleepy) existence, shall avoid an unprofitable life.

4. As long as the priests neither wishing, nor striving to avoid, meeting together in congregations, shall not evade meeting together in congregations.

5. As long as the priests neither wishing nor seeking to associate with evil-doers, shall shun the society of sinners.

6. As long as the priests neither desirous of, nor addicted to, forming the intimacy of sinners, shall abstain from becoming the friends of sinners.

7. As long as the priests do not relinquish the pursuit of the sanctification, (of *arahathood,*) discouraged from their having met some trifling impediment, the designs of the bhikkhus, &c.

The third series of the seven imperishable precepts are: As long as the priests shall be endowed with faith; shall be influenced by a sense of shame; shall have no abhorrence of sin; shall be profoundly versed (in the tenets of their religion); shall be of unwearied perseverance; shall be of retentive memories; and shall be endowed with wisdom, the designs of the priests, &c.

The fourth series comprehend the seven *Bojjhangá*, or acquirements of doctrinal knowledge.

The fifth series consist of the seven *Sanná*, or recognitions.

The sixth and seventh series of precepts are of a mixed character, and could not be intelligibly defined without entering into an extensive detail inadmissible in this analysis.

The SUTTAN then proceeds:

"BHAGAWA', continuing to dwell there, at the *Gijjhakuṭo* mountain at *Rájagahan* propounded largely to the priesthood, in a similar manner, his discourses on *dhammo*—explaining such is *sílán*—such is *samádhi*—such is *panna*—by acquiring *sílán*, the gift of *samádhi* is realized, the fruit whereof is great: by acquiring *samádhi*, the gift of *panna* is realized, the fruit whereof is great: by acquiring *panna* the mind is completely rescued from the influence of sinful passions—which be these—the passions of sinful desires; the passion for life (by transmigration); the passion for heresy (arising out of instability of faith), and the passions engendered by ignorance.

"Thereafter BHAGAWA' having dwelt at *Rájagahan* as long as it was agreeable to him, he said to the beloved A'NANDO: A'NANDO, let us depart; wherever *A'mbatthiká**, may be, thither let us proceed. The venerable A'NANDO replied unto BHAGAWA', saying: Lord, be it so. Thereupon BHAGAWA' accompanied by a great concourse of bhikkhus proceeded to *A'mbatthiká*."

BUDDHO there discourses on the same topics, and then repairs similarly attended to *Nálandá*†, where he sojourns in the *Páwáriko* garden. There SARIPUTTO, one of his two chief disciples, (MOGGALLANO being the other chief disciple,) observes to BUDDHO, that there had not existed, did not then exist, and would not ever appear hereafter, any one equal to, or greater than, BHAGAWA'. To which observation, SA'KYA replies at great length, attributing SARIPUTTO's ignorance on this subject to his powers of inspiration being more limited than his own; and tells him that supreme Buddhá had existed before him, and would be manifested also in after ages. There also BHAGAWA' propounds, as at other places, the doctrines of his faith.

From *Nálandá* BUDDHO repairs to *Patiligámo* with the same retinue, and dwells at the *Awásathágárán*‡ which is duly fitted up for him by the *Gahápati* (the principal inhabitants of the place), to whom he explains the principles of *sílán* and the fruits derived by its observance. At that period two great ministers of the king of *Mágadha*, SUNIDHO and WASSAKARO were building a *(Nagaran)* citadel in the village *Pátali*, for the purpose of checking the *Wajjians*. BUDDHO there predicts that the village *Pátali* is destined to become a great city; announcing also that it is destined to suffer under the calamity of fire, of water and of treachery§. On hearing this prediction the two *Mágadha* ministers wait on BUDDHO to invite him to a repast at their residence. He accepts the invitation. The gate (of the city in progress of construction), and the ferry of the *Ganges*

* The *Aṭṭhakathá* explains that this is a royal garden situated near *Rájagahan*, so called from an excellent (*amba*) mango-tree which stood at its gate.

† Is stated to be distant from *Rájagahan*, one *yójano*, (about 16 miles.)

‡ It would appear by the *Aṭṭhakathá* that *Páṭali* was an inferior town, or as the term implies, a mere village at this time; and it is stated that the inhabitants of this village suffered great hardships and extortions, by being turned out of their houses, for a fortnight and a month at a time, to accommodate the officers and messengers who were continually passing and repassing between *Wésáli* and *Rájagahan*. To avoid these oppressions the inhabitants built this *A'wásathágárán* or rest-house in the middle of the town, for the accommodation of travellers.

§ The *Aṭṭhakathá* explains that a part of the town is to be destroyed by fire; that *a part is to be swept away by the river;* and a part by treachery and perfidy. A very comprehensive prophecy, the realization of some part of which was scarcely avoidable. Buddhists, however, point with exultation to the partial destruction of ancient *Palebothra* by the river.

he passes, obtain the name of the *Gótamo* gate and *Gótamo* ferry. The *Ganges* is overflowed at the time; and he and his disciples pass by miraculous means.

The Second Bhánawáro.

From *Páṭiligámo* BHAGAWA' attended by A'NANDO, and the same retinue of priests then repairs to *Kóṭigámo**, where he explains the nature of the *A'riyasachcháni* or the four sublime truths, as well as the nature of *sílan*, *samádhi* and *panna*. BUDDHO from thence repairs to *Nadikógámo*†, where, on being interrogated by A'NANDO as to the fate of certain sanctified and pious persons who had died in *Nádikógámo*, he reveals what their condition will be subsequent to their death, and propounds his sermon entitled the *Dhammadáso* or the *Dhammo* reflector, which is illustrative of his miraculous vision, on which all passing events are inevitably and invariably reflected, as on a looking-glass.

From *Nadikógámo*, BHAGAWA' proceeds to *Wésáli*; and takes up his residence in the *Ambapáli*‡ garden. He there preaches on the four *Satipaṭṭháná*, of which the bhikkhus are to be observant. The *Suttán* then gives the following account of the interview that took place between BUDDHO and the courtesan to whom this garden belonged.

"The courtesan AMBAPA'LI having heard that BHAGAWA' had arrived in *Wésáli*, and was sojourning in her garden *Ambapáliwano*, equipping a superb vehicle for herself, and magnificent conveyances (for her suite), setting out from *Wésáli*, proceeded to the garden, using these conveyances as far as they could be used; and the rest of the way, descending from the vehicle, she proceeded on foot, and waited on BHAGAWA'—Having approached and bowed down to him, she took her seat on one side of him. BHAGAWA' addressed the courtesan AMBAPA'LI, who was thus seated by his side, a discourse on *dhammo*. He confirmed her faith, comforted her, and made her steadfastly confide (therein). She who had been thus confirmed in her faith, comforted, and made steadfastly to confide (therein) addressed BHAGAWA' saying; Lord BHAGAWA', vouchsafe to accept the repast I shall prepare for thee, as well as thy disciples, to-morrow. BHAGAWA', by his silence, consented to accept the same. The courtesan AMBAPA'LI thereby understanding that the invitation was accepted by BUDDHO—rising from her seat, bowing down to him, and performing the *padakkhinán* (walking respectfully round him) thrice, departed."

* Its position is not described. *Koṭi* signifies end. As the end of the rája MAHAPANA'DO's palace was situated in that village, thence it is stated to have derived the appellation of *Kótigámo*.

† So called from a marsh near which the village was situated.

‡ This pleasure garden belonged to a female of high rank named AMBAPA'LI, one of the accomplished courtesans of *Wésáli*—a class of persons of great influence at that period from their wealth and mental accomplishments. There appears also to have been an office conferred by the rulers of *Wajji* on a female, designated the *nagarasóbhini-ṭhánantarán*, which literally signifies "the chiefship of the beauties of the town." Vide *Maháwanso*, p. XXXVI.

On her return to the town she meets the rulers of *Wésáli*, repairing to *Ambapáliwano*, gorgeously apparelled, and in superb equipages. Her suite compel them to make way for her, and she declines acceding to their entreaty to resign to them the honor of entertaining Buddho the next day; and Bhagawa' himself, though solicited by these chiefs, adheres to his promise made to the courtesan. He attends accordingly, and he and his disciples are served with her own hands by the courtesan. After the repast, she takes her seat again on one side of him; and implores of him to accept the *Ambapáli* garden as an offering made to him and his disciples. The offering is accepted; and he preaches another sermon at her house.

From *Ambapáliwano* Bhagawa' repairs to *Bélugámako**, and there calling his disciples together he tells them that as the season of *Wasso*† was at hand, they should disperse around *Wésáli*, according to the invitations they may have received from the resident priests, who were friendly to them; and that he himself would keep his *Wasso* at *Bélugámako*. The *Suttan* proceeds—

"Unto Bhagawa', who was holding his *Wasso* there, a severe illness was engendered, producing agonies indicative of approaching death. He however, retained his mental faculties and his self-possession, without giving way to the disease. Bhagawa' then thus thought: It is unworthy of me that such as I should pass into *Parinibbánán* without having assembled those who have assisted me, and without addressing myself to the priesthood: it is indispensible that I should submit to this trial with fortitude, maintaining my professions in regard to the transitory matters of this life."

From this sickness Buddho partially recovers, and is able to sit up in his pulpit. The rest of this *Bhánawáro* is occupied by a dialogue between Bhagawa' and A'nando, expressive on the part of the priesthood, of their expectation that they may receive further instruction, and on the part of Sa'kya, of the assurance that he would not, like earthly teachers, withhold any thing; announcing at the same time, that at his advanced age of seventy, with the infirmities he was labouring under, his career was drawing to a close.

The third Bhánawáro.

Subsequently, on a certain morning, Bhagawá makes a pilgrimage in search of alms through *Wésali*, and after his morning repast attended by A'nando, repairs for his noon-day rest to the *Chepálá*‡

* A village situated near *Wésáli*, so called from a tree of that name.

† The rainy season from July to November, during which the Buddhist priests are enjoined to abstain from pilgrimage, and devote themselves to stationary religious observances. The *Wasso* here described is the one of 544 before Christ. Buddho died the following year B. C. 543 in the month of *Wésukho*, (April-May.)

‡ It is not explained whether all these *chétiyani* are situated in the *Wésáli*, or at different places.

chétiyo. BUDDHO there expatiates on the perfections of that *chétiyo*, as well as the *Wésáli*, the *Udéni*, the *Gótamá*, the *Sattambako*, the *Bahupatto* and the *Sárandado chétiyáni;* and explains that it is in the power of any BUDDHO, by his four *(idhi)* miraculous attributes, to prolong his existence even for a *kappó*, if, while sojourning at any of these places he is duly entreated thereto. MÁRO *(Death)* imperceptibly exerts his influence, and prevents A'NANDO from comprehending this exposition made by BHAGAWÁ, though repeated twice. A'NANDO then retires to the foot of a tree, disconcerted, and seats himself there.

Before A'NANDO had proceeded to any great distance, the impious MÁRO approaches BHAGAWA', and having approached him and stationed himself on one side of him, thus addressed him: Lord BHAGAWA', vouchsafe to realize thy *Parinibbánán* now. SUGATO, this is the appointed time for thy *Parinibbánán*. It has been declared so by thee, Lord BHAGAWA', on a former occasion*, &c.

BHAGÁWA' replies that his death is at hand; and that his *Parinibbánán* will take place in† three months. He then announces his resignation of all connection with this transitory state of existence, to prepare for his death, by chaunting this hymn. "Having voluntarily overcome his desire for this life, the Muni has vouchsafed to relinquish all that is transitory, connected either with his human or divine essence, casting his existence from him, like unto a victorious combatant who divests himself of his armour."

On his uttering this announcement, the earth quakes, miracles are manifested, and the music of the heavens ring; whereby A'NANDO, who was still at the foot of the tree, being roused, hastens to BHAGAWA'. He inquires from him the cause and the import of an earthquake; BUDDHO and explains that "The great earth rests on water, the water is sustained by the wind, and the wind is supported by the air (or atmosphere); and when a storm prevails a natural earthquake is produced—this is the first cause; and the effect a great quaking of the whole earth. The second series of causes proceeds from the miraculous powers possessed by inspired persons; the third cause is the death of a Buddho elect in the *Táwatinsa* heavens, to be regenerated in the

* The former declaration was made by BUDDHO at the close of the probational meditation of seven weeks when he attained Buddhohood at the Bo tree; on which occasion also Death urged him to close his career there. He then said he would not resign his mission till his disciples had been fully qualified for their duties; and his *dhammo* had been perfectly established.

† About the middle of January, B. C. 543, two months after the termination of *Wasso*.

life in which Buddhohood is attained; the fourth cause is the birth of a Buddho; the fifth cause is the attainment of Buddhohood; the sixth cause is the proclamation of the supremacy of his faith; the seventh cause is a Tathágato's renunciation of his connection with this transitory existence; and the eighth cause is his final *Nibbánan:* in the instance of each cause, the effect is the same, viz.: a quaking of the great earth."

BUDDHO then explains that there are eight classes of beings; the *Kottiyo, Bráhmano, Gahápati, Sumano, Chatumahárájiká,* those of *Táwatinsa,* those of MA'RO (death) and of BRAHMO; and he relates how a BUDDHO is generated and fulfils his destiny in each.

He next explains the nature of the eight *Abhibhayatanáni,* and of the eight *Wimokkhá;* and informs A'NANDO of the interview he had had formerly with MÁRO, as well as on that day. The *Suttan* proceeds in these words.

"On this explanation being afforded, the venerable A'NANDO thus addressed BHAGAWA': Lord BHAGAWA,' vouchsafe to live a *kappo:* for the welfare of multitudes, for the happiness of multitudes, out of compassion for the world, and for the welfare and happiness of the *dewá* as well as men: O SUGATO, live for a *kappó.*

"Enough A'NANDO, importune not TATHA'GATO. A'NANDO, the time is now past for making this entreaty of TATHA'GATO. A'NANDO, however made the same entreaty a second and a third time; (and BUDDHO said) A'NANDO, dost thou believe in the Buddhohood of TATHA'GATO.

"Yes, lord.

"Then, A'NANDO, why dost thou now even to a third time afflict TATHA'GATO with unavailing importunity?

"Lord, from thyself have I heard, and by thyself have I been taught, saying: A'NANDO, to whomsoever is fully vouchsafed the sanctification of the four *Idhipádá* should he desire it, he may live a *kappo,* or any part of a *kappo;* and unto TATHA'GATO also is vouchsafed those four *Idhipádá.*

"Dost thou, A'NANDO, believe therein?

"Yes, lord.

"Then, A'NANDO, in that case, the neglect and the fault is thine—for it occurred not to thee, when that revelation was made by TATHA'GATO, in the most solemn and public manner (at the *Chepala chétiyo),* to comprehend the same, and to implore of TATHA'GATO, saying: BHAGAWA', vouchsafe to live for a *kappo,* for the welfare of multitudes, for the happiness of the *dewá* as well as men: O, SAGATO, live for a *kappo.* What dost thou now, A'NANDO, still importune TATHA'GATO? TATHA'GATO has rejected thy prayer twice: could he grant it on the third application? In this matter, A'NANDO, most assuredly, both the neglect and the fault is thine."

BUDDHO then reminds A'NANDO of the various places, all which he names, where he had made this revelation to him before, and finally tells him that having announced that he is to die in three months that destiny cannot be altered. They next repair to the *Kuṭágara* edifice, and BUDDHO delivers a solemn charge to the priesthood, which he concludes with these words:

"Bhikkhus, I am now addressing you (for the last time): transitory things are perishable, without procrastination, qualify yourselves (for *nibbánan*). At no distant period unto TATHA'GATO *parinibbánan* will be vouchsafed. Within three months from this day, by death TATHA'GATO will realize *nibbánan*.

"Thus spoke BHAGAWA', and having so delivered himself, the divine teacher of happy advent again spoke saying: My age has attained the fullest maturity: the remnant of my existence is short: I shall depart, separating (myself) from you, and having earned the salvation of my own *(attá)* soul. Bhikkhus, unremittingly embuing your minds with faith, lead the life of the righteous; and keeping your thoughts under entire subjection, carefully watch over the aspirations of your minds. Whoever steadfastly adheres to the tenets of this *dhammo*, escaping the eternity of transmigration, will achieve the extinction of misery."

The fourth Bhanáwáro.

The next morning BUDDHO enters the city of *Wésáli*, robed, and carrying his begging dish in his hand; and having made his afternoon meal, he surveys with an elephant* look *Wésáli* for the last time, and departs attended as before to *Bhandugámo*. There BHAGAWÁ assembles the priesthood, and explains to them the nature of *sílan*, *samádhi*, *pannâ* and *wimutti*. He then similarly preaches at *Ambagámo*, and *Jambugámo*.

BHAGAWÁ next repairs to *Bháganagaran*, delivers to the priesthood at the ANANDO *chetiyo*, his discourses called the *Padésa Suttáni*, in which he inculcates on his audience, that they are neither to be opinionated, nor hasty in the adoption of the opinions of other priests: if any new doctrine is set forth, they are to examine it dispassionately, by reference to his own *winéyo* and *sutto*. If it accord with them, they are to adopt it; if it differs from them, they are to reject it.

He then visits *Páwá*, tarrying in the *Ambawano* or mango grove, belonging to a goldsmith called CHUNDO who waits on BUDDHO, and invites him, as the *Wésáli* courtesan had done, to a repast the next day at his house in the city of *Páwá*. On reaching the goldsmith's house BUDDHO thus addressed him: CHUNDO, if any pork is to be dressed by thee, with it only serve me: serve to the priests from any other food or provision thou mayest have prepared. CHUNDO having replied: Lord, be it so: BHAGAWÁ again calls him, and says, CHUNDO, if any of the pork prepared by thee should be left, bury it in a hole—for CHUNDO, I see not any one in this universe, though inhabited by dewos, maros and brahmos, with their hosts of ascetics, brahmans, déwos and men, excepting TATHÁGATO, who would digest it, if he ate the same. CHUNDO accordingly buries the remnants of the pork.

* Buddhá and *Chakkawatti* rájas are peculiarly formed in the neck, which is said to consist of a single bone. They are obliged therefore to turn round like an elephant, to look at any object not immediately before them.

Bhagawá then preaches to his host; and having gratified, edified and comforted him, he departs. He was soon after afflicted with a severe attack of dysentery, the expected and predestined result of eating pork,—which under this conviction he interdicted being given to any one else. He then decides on hastening to *Kusinárá*, the city in which he is destined to realize his *nibbánan*. On his journey, feeling faint, he desires A'nando to prepare a seat for him off the main road, under the shade of a tree; and seated there he commands his disciple to bring him some water to quench his thirst. A'nando entreats of him to proceed a little further up the *Kukuṭṭhána* river, as at that spot "the stream had been disturbed by the passage of five hundred carts." Buddho however three times repeats his commands to A'nando to bring him that water. He obeys at last, which leads to a miracle being performed, whereby the muddy water is rendered perfectly clear. The owner of these carts is one Pukkuso, a member of the *Mallawo*, royal race, and an ascetic of the fraternity of *Alárakálámo*, who was then on his road from *Kusinárá* to *Páwá;* and he was following his train. He hears of Buddho being in the neighbourhood, and waits on him; and a discussion ensues between them, of the relative merits of Alárokalámo and of Buddho, at the conclusion of which, Pukkuso bestows two *(Singiwannawatthání)* cloths of golden hue, one on Bhagawá and the other on A'nando. The latter spreads his accepted offering also on the person of Bhagawá, whose body "shines like a bright flame free from smoke or ashes." On the miracle being noticed by A'nando, Buddho explains that such is always the case with a Tathágato on the day he attains Buddhohood, and on that on which he realizes *nibbánan*—and he adds: A'nando, in the last division of this night, at *Kusinárá* in the grove of *sála* trees belonging to the *Malla* princes, the *parinibbánan* of Tathágato will be realized, (while reposing) between two of those *sála* trees. Let us depart, A'nando, and repair to the *Kukuṭṭhá* river. The venerable A'nando replied: Lord, be it so.

Thereupon Bhagawá, with a great concourse of bhikkhus repairs to the *Kukuṭṭhá* river, and descending to the stream and having bathed and drank there, and then landing on the opposite bank, he proceeds to a mango grove (on the bank of the river). There he enjoins A'nando to relieve Chundo, the goldsmith, from all apprehension of his death having been occasioned by the repast he had provided for Buddho, informing him of the rewards he had realized by that act of charity and faith.

The fifth Bhánawáro.

Bhagawá then repairs to the *Uppawattana** grove of *sála* trees, on the further bank of *Hirannawattiyá* river, near the city of *Kusinárá*, accompanied by his disciples; and in his debilitated state he desires A'nando to prepare his bed for him between the *sála* trees, placing his head to the north; on which he lays himself down on his left side. The grove was then in flowers to the ends of its stems, though not the blossoming season. These flowers descended spontaneosuly on his head, the host of déwos made the air ring with the music of the heavens, and showered down flowers, sandal, and other incense on him. Bhagawá, noticing these preternatural recognizances of his Buddhohood, impresses on A'nando that the stedfast observance of his *dhammo* is an equally acceptable recognizance of him.

He then desires his disciple, Upawano, who was standing in front of him fanning him, to retire. This injunction leads to A'nando's asking why he sends him away; and he replies that the déwatá of the ten thousand worlds are then hovering in the air, and lamenting his approaching death, and that he ought not to be partially screened from their sight. A'nando then announces, that the bhikkhus are pouring in from all quarters to witness his *nibbánan;* and Bhagawá remarks, that not only those who come to witness the birth, the attainment of Buddhohood, the promulgation of the supremacy of the faith, and the *nibbánan* of a Buddho, but even those who pray at the shrines that will be raised to him, will be born in heaven.

A'nando then inquires how priests should comport themselves in their sacerdotal intercourse with women; and how his disciples should dispose of his corporeal remains after death. He replies as to the former: A'nando, do not look at them. Having looked at them, lord, what should be done then? Do not speak to them, A'nando. Having spoken to them, what should be done then? A'nando keep thyself collected. As to his corporeal remains, he replies, that rájas and grandees of the land will attend to his funeral obsequies; and that his disciples need not afflict themselves in that respect. He states also

* Buddhagho'so in his *Aṭṭhakathá* notices that the road from the bank of the *Hirannawattiya* river to the grove of *sála* trees resembles that from the bank of the *Kalambo* river at *Anurádhapura* through the gates of the *Rájamátu* wiháro to the *Thúpárámo;* and that the *Uppawattána* grove was to *Kusinárá* what the *Thúpárámo* was to *Anurádhapura.* He also mentions that so debilitated had Buddho become from his attack of illness, brought on by the repast he had partaken from Chundo, that he was obliged to rest twenty-five times, on the journey from *Páwá* to *Kusinárá* although the distance was only three gawutáni, (about 12 English miles.)

that his cremation will be conducted with the same honors as that of a *Chakkawatti* rája, which he thus describes: they wind a new cloth round the corpse; having wound it with a new cloth, they enclose it in a layer of floss cotton; having encased it in a layer of floss cotton, they bind that with another new cloth. Having in this manner enclosed a *Chakkawatti* rája's corpse, in five hundred double layers (of cotton and cloth) and deposited it in a metal* oil-chaldron, and covered it with another similar vessel, and having formed a funeral pile with every description of fragrant combustibles, they consume the body of a *Chakkawatti* rája; and for a *Chakkawatti* rája they build the *thupo* at a spot where four principal roads meet. It is in this manner, A'NANDO, they treat the corpse of a *Chakkawatti* rája. Whatever the form observed in regard to the corpse of a *Chakkawatti* rája may be, it is proper, A'NANDO, that the same form should be observed in regard to the corpse of TATHÁGATO.

BHAGAWA' next dwells on the merits that are acquired by building *thúpá* over relics of *Tathágatá, Paché-Buddha, Sáwaká* and *Chakkawatti* rájas. A'NANDO then retires into the wihàro, to weep in private at the approaching death of BUDDHO, who sends for him, comforts him by the approbation of his past conduct, and the assurance that he will shortly attain arahathood. He then assembles the bhikkhus, and expatiates on the merits of A'NANDO, especially pointing out his four miraculous gifts, which are the attributes of a *Chakkawatti* rája. A'NANDO thereupon thus implores of BUDDHO; Lord, let not BHAGAWA' realize his *parinibbánan* in this inferior town, which is an insignificant and a branch† town: there are, lord, other chief cities which be these—*Champá, Rájagahán, Sáwatthi, Sákétán, Kósambi* and *Báránasi*. Let BHAGAWA' realize his *parinibbánan* there. There are numerous illustrious tribes of *Khattiya, Brahamana* and *Gahápati* there. They are greatly devoted to TATHA'GATO—they will duly celebrate his funeral rites. Not so, A'NANDO—make no such proposition: and BUDDHO proceeds to reveal that *Kusinárá* was once celebrated under the denomination of *Kusáwatti*, then the capital of *Mahasudassano* rája, and to describe its grandeur at that period. He enjoins A'NANDO to enter *Kusinárá*, and announce to the *Malla* princes, that in the last watch of that night TATHA'GATO is to realize his *nibbánán;* and to invite them to attend. A'NANDO obeys this command, accompanied by an attendant. He finds the principal inhabitants assembled at the *Santhagárá sálá* (hall of assembly) on some other business; and the

* The *Aṭṭhakatha* requires this word to be rendered gold.

† Literally rendered for "*Sakhanagarako.*"

announcement of his mission leads to universal lamentation, and the people run through the town with dishevelled hair, and hands folded over their heads. The *Kusinárians* attend in such numbers on BUDDHO, that finding they cannot individually pay reverence to him, A'NANDO divides them according to their tribes, and each tribe bows down at once, with their hands raised over their heads.; A'NANDO calling out at the time of their adoration—Lord, such a tribe with their sons, daughters and followers are bowing down at the feet of BHAGAWA' with uplifted hands. To these adorations BUDDHO makes no reply; and during the first division of the night A'NANDO completes the presentation of the *Malla* tribes of *Kusinárá*, by thus collectively presenting them in tribes. One SUBHADDO is then admitted into the presence of BUDDHO, for the purpose of having a doubt solved. This discussion terminates in SUBHADDO being ordained, and ultimately becoming an *arahat*. He is the last disciple ordained by GO'TAMO.

The sixth Bhánáwáro.

BHAGAWA' then thus addressed the beloved A'NANDO: A'NANDO, can there be, or has there been any precept of mine, not imparted unto thee by SATTHA' (the divine teacher)? No, SATTHA' there can have been none. If there be none such, A'NANDO, be it understood that whatever *dhammo* or *winéyo* may have been propounded or established by me for thee, the same, after my demise, is to stand in the stead of the divine teacher unto thee. A'NANDO, although the bhikkhus are now in the habit of addressing each other (indiscriminately) with the appellation *áwuso*, after my death this practice must no longer prevail among you. By a senior bhikkhu, a junior bhikkhu ought to be addressed by the appellation *áwuso** preceded either by his family or personal name. By a junior bhikkhu an elder bhikkhu ought to be addressed *bhanté* (lord), or *áyasmá* (venerable). Let no well-disposed priesthood reject any of my precepts, whether they be trivial or important. A'NANDO, after my death, let the *brahmadando* penalty be awarded to the bhikkhu CHHUNNO.

Lord, what is the *Brahmadando?* A'NANDO whatever any bhikkhu may have desired, that CHHUNNO has been advocating: it is not proper that he should be spoken to, exhorted by, or communed with, by the bhikkhus.

BHAGAWA' then thus addressed the bhikkhus: Bhikkhus, should there ever unto any one bhikkhu be any doubt or incomprehensibility as regards either *Buddho*, *Dhammo*, *Sangho*, *Maggo*†, or *Patipadá*, inquire (at once): do not reproach yourselves hereafter saying, although SATTHA' was personally present to us, we lost the opportunity of making our inquiry personally of him. On being thus addressed the bhikkhus remained silent. BHAGAWA' similarly exhorted them a second and a third time; and the bhikkhus still remained silent.

BHAGAWA' again exhorted them saying: Bhikkhus, if it be out of profound reverence for the SATTHA' that ye abstain from inquiring directly from him;—

* This term implies perfect equality, and as in the order of ordination one bhikkhu must be senior to another, an appellation implying equality applied by a junior to a senior *Upasampadá* is disrespectful and irreverend.

† *Maggo* is the road that leads to *nibbánán*, and *patipadá* is the life of righteousness that ought to be observed on that road.

bhikkhus, let one confiding priest make the inquiry through another in whom he confides. Even on being thus conjured the bhikkhus remained silent.

Thereupon the venerable A'NANDO thus addressed BHAGAWA': Lord, this is miraculous: Lord, this is wonderful: I place implicit confidence in this congregation of bhikkhus: not even unto one bhikkhu is there any doubt or incomprehensibility in regard either to *Buddho*, *Dhammo*, *Sangho*, *Maggo* or *Patipadá*. A'NANDO, it is thy faith that impels thee to make this declaratio n: the omniscience of TATHA'GATO is in the same manner conscious, that not even unto one bhikkhu is there any doubt or incomprehensibility in regard to *Buddho*, *Dhammo*, *Sangho*, *Maggo* or *Patipadá*. A'NANDO, among these five hundred bhikkhus, even the last one, has attained the *Sotápanno*,—the grace that rescues him from hell, and the sanctification that realizes arahathood.

BHAGAWA' then addressed the bhikkhus saying: Bhikkbus, I am exhorting you (for the last time), transitory things are perishable: without procrastination qualify yourselves (for nihhánán). These were the last words of TATHA'GATO.

BHAGAWA' then became absorbed in the first *Jhánán-samápati*; passing from the first *Jhánán* he became absorbed in the second *Jhánán*; passing from the second *Jhánán*, he became absorbed in the third *Jhánán*; passing from the third *Jhánán*, he became absorbed in the fourth *Jhánán*; passing from the fourth *Jhánán*, he became absorbed in the *ákásánánchayatánán*; passing from the *akásánanchayatánan*, he became absorbed in the *winnánanchayatánan*; passing from the *winnánanchayatánan*, he became absorbed in the *akinchánnayatanan*; passing from the *akinchánnayatánan*, he became absorbed in the *néwasannánasannáyatanan*, and passing from the *néwasannánasannáyatanan*, he became absorbed in the *sannawédayitanirodhan*.

The venerable A'NANDO then thus inquired of the venerable A'NURUDHO: Lord, has BHAGAWA' expired? No, *áwuso* A'NANDO, BHAGAWA' has not expired: he is absorbed in the *wédayitanirodhan*.

From this *wédayitanirodhan*, BUDDHO step by step descends again to the first *jhánan*, and again rises to the fourth *jhánan*. In the transition between the fourth and fifth *jhánan*, BHAGAWÁ expired.

On BHAGAWA' attaining *parinibbánan*, at the instant of his realization thereof, the great earth quaking, produced a terror that made the hair stand on end; and the music of the gods rang in the air. On BHAGAWA' attaining *parinibbánan*, at the instant of his realization thereof, BRAHMA' SAHANPATI sang this *gáthá*: All living creatures shall relinquish their existence in this world, and in like manner, in this world the divine teacher, the incomparable, the being of felicitous advent and of power, the supreme BUDDHO, also dies.

On BHAGAWA' attaining *parinibbánan*, at the instant of his realization thereof, SAKKO the monarch of the déwos sang this *gáthá*: Things that are subject to reproduction and death being transitory are most assuredly perishable—having been produced they perish: it is a blessing to arrive at their extinction, (by the attainment of *parinibbánán.)*

On BHAGAWA' attaining *parinibbánan*, at the instant of his realization thereof, the venerable ANURUDHO sang these *gáthá*: He no longer indicates inspiration and respiration as when living; the immaculate MUNI, whose aim was *nibbánan*, has expired. He endured the agony of death in the full possession of his mental faculties: those mental faculties expired like the extinction of a lamp.

On BHAGAWA' attaining *parinibbánan*, at the instant of his realization thereof, the venerable A'NANDO sang this *gáthá*: When the all-perfect supreme BUDDHO expired, then there was a great terror—then the hair stood on end.

On BHAGAWA' attaining *parinibbánan*, of those bhikkhus who had not yet realized arahathood, some wept aloud, with uplifted arms—some sank (on the earth) as if they had been felled—and others reeled about, exclaiming: too soon has BHAGAWA' expired—too soon has SUGATÓ expired—too soon has the *chakku* (eye) closed on the world. But those bhikkhus who had attained arahathood, collectedly and composedly submitted themselves, saying: transitory things are perishable—how can we in this world obtain it (permanency).

The venerable ANURUDHO then addressed the bhikkhus: *A'wuso*, enough—grieve not—bewail not—Why, has it not been emphatically declared by BHAGAWA' himself saying: even amidst every community of happy and contented persons, various destructive and changeable issues come to pass. *A'wuso*, how can we in this world obtain it (permanency). It is not by merely saying of any thing born or otherwise produced, which from its perishable nature, is transitory—"most assuredly it perishes not,"—that it will come to pass. *A'wuso*, the *dewatá* are reproaching us (for our lamentations). (The bhikkhus inquired), Lord, does the venerable ANURUDHO discern the *dewatá?* Yes, *A'wuso* A'NANDO, the *dewatá* are looking down on earth from the skies: with dishevelled hair they are weeping; and with uplifted arms they are bewailing—they are falling as if felled, and reeling about, they are exclaiming: too soon has BHAGAWA' expired—too soon has SUGATO expired—too soon has the *Eye* closed on this world.

The *Suttan* repeats in regard to the *dewatá*, what has been said of the bhikkhus, as to a portion having attained arahathood, and others not having acquired that sanctification; and describes the different manner in which each bore the loss of BUDDHO.

The remainder of that night the venerable ANURUDHO and the venerable A'NANDO passed in discoursing on *dhammo*. Then (at the dawn of day) the venerable ANURUDHO thus addressed the venerable A'NANDO: *A'wuso* A'NANDO, depart: entering *Kusinárá*, warn the *Kusinárian Malla* tribes, saying: descendants of *Wásetṭho*, BHAGAWA' has realized *nibbánán*. Know ye that this is the time for the performance of your (allotted) part. The venerable A'NANDO, replying: Yes, lord. Pursuant to that direction, early in the morning, arraying himself, and taking his robes and begging-dish with him, atteuded by a second person, he entered *Kusinárá*. At that moment the *Kusinárián Malla* tribes were gathered together in their assembly hall, in consequence of this very circumstance. Wherever that assembly hall of the *Kusinárian Malla* tribes might be, thither the venerable A'NANDO proceeded; and thus addressed the *Kusinárian Mallians:* Descendants of *Wásetṭho*, BHAGAWA' has achieved *parinibbánán*. Know ye that this is the time for the performance of your (allotted) part.

On hearing this announcement of the venerable A'NANDO, the *Mallians*, the *Mallian* youths, the *Mallian* damsels, and *Mallian* wives—afflicted, disconsolate, and oppressed with grief,—some wept with dishevelled hair, some bewailed with uplifted arms—some dropt as if felled, and others reeled to and fro, exclaiming: Too soon has BHAGAWA' died: too soon has SUGATO died: too soon has the *Eye* closed on the world.

Thereupon the *Kusinárian Mallians* issued this command to their men: collect then in *Kusinára* garlands of flowers, and procure every description of musical instrument. Accordingly the *Kusinárian Mallians*, taking with them garlands of flowers, every description of musical instrument, and five hundred pairs of cloths—wherever the *Upawattano sálá* grove of the *Mallians* might be, there they approached the corpse of BHAGAWA'. Having approached the corpse of BHAGAWA'—with dan-

cing and vocal and instrumental music, and with odoriferous garlands,—performing the prescribed offices, and rendering (every mark of) reverence, respect and submission, they employed themselves that day in suspending cloth-draperies, and erecting tented pavilions.

This thought then occurred to the *Kusinárian Mallians*:—The time is altogether insufficient to burn the corpse of Bhagawa' to-day: we will perform the cremation of Bhagawa' to-morrow. The *Kusinárian Mallians*, with dancing, and vocal and instrumental music, and odoriferous flowers performed the prescribed offices to the corpse of Bhagawa', reverently, respectfully and submissively; suspending cloth draperies and erecting tented pavilions, and in this manner they passed the second day also. They in like manner occupied themselves, the third, the fourth, the fifth and the sixth day.

Then on the seventh day this thought occurred to the *Kusinárian Mallians*:—Having, unto the corpse of Bhagawa',—with dancing and vocal and instrumental music, and with sweet-scented flowers,—performed the prescribed offices, with reverence, respect and submission; taking it out of the southern gate to the southward of the city,—and by the suburb (keeping to) the outside to the southward of the city, we will perform the cremation of the body of Bhagawa'.

Instantly eight *Mallian* chieftains, bathing from head (to foot), and clothing themselves in new raiment, said, we will bear the corpse of Bhagawa'. They, however, failed in their effort to lift it. The *Kusinarian Mallians* then thus inquired of the venerable Anurudho: Lord Anurudho, whence, and from what cause, is it that these eight *Mallian* chieftains, who, purified from head (to foot), and clad in new raiment, said: we will bear the corpse of Bhagawa'—have found themselves unequal to the effort of raising it?—*Wáseṭṭhians*, your intentions and the intentions of the *dewatá* are different. What, then, lord, is the intention of the *dewatá*? *Wáseṭṭhians*, your intention is this: we will carry the corpse of Bhagawa' with dancing, and vocal and instrumental music, and decorated with sweet-scented garlands, performing every requisite office reverently, respectfully, and submissively, through the southern gate to the southward of the city, and through the outskirts, keeping to the suburb on the southward of the town, will perform the cremation of Bhagawa'. But *Wáseṭṭhians*, the intention of the *dewatá* is this: we, with celestial dance as well as heavenly vocal and instrumental music, decorated with odoriferous garlands, carrying the body of Bhagawa'—performing every prescribed office thereto, reverently, respectfully and submissively—through the northern gate to the northward of the city, and entering the town by the northern gate, and by the central gate, conveying it into the middle of the city, and departing out of the eastern gate to the eastward of the town, there, in the coronation hall, (*Makuṭabandhanán*) of the *Mallians*, we will perform the cremation of the body of Bhagawa'. Lord, whatever be the intention of the *dewatá*, be it acceded to.

Instantly, every place in *Kusinárá* which was a receptacle of dirt, filth and rubbish became covered knee-deep, with the celestial flower *mandárá*—and the *dewatá* as well as the *Kusinárian Mallians*, carrying the corpse of Bhagawa', with celestial and human dance, as well as vocal and instrumental music, and with odoriferous garlands, performing every requisite office, with reverence, respect and submission; and conveying it through the northern gate to the northward of the city, and entering through the middle gate to the centre of the town*, and departing through the

* The *Aṭṭhakathá* notices that while the corpse was in the city, the princess Mallaka', the widow of Bandhulo, the late *Mallian* commander-in-chief, invested the corpse with her late husband's official insignia called *mahálatá*, which jewels had remained unused from the time of his death.

eastern gate to the eastward of the town, deposited the corpse of BHAGAWA' there in the coronation hall of the *Mallians*.

The *Kusinarian Mallians* then thus inquired of the venerable A'NANDO: How, lord A'NANDO, should we dispose of the corpse of BHAGAWA'? *Wasetthians*, it is proper that it should be treated in the same manner that the corpse of a *Chakkawatti* rája is treated. And in what manner, lord A'NANDO, should the corpse of a *Chakkawatti* rája be treated?

A'NANDO here repeats the explanation that he himself had received from BUDDHO.

Thereupon the *Kusinarian Mallians* gave this order to their people: Fellows, collect for us *Mallians* some floss cotton; and then the *Kusinarian Mallians* wound the corpse of BHAGAWA' with a new cloth; having wound it with a new cloth, they covered it with a layer of floss cotton; having covered it with a layer of floss cotton, they again wound it with a new cloth; and in this manner having wound the body of BHAGAWA' with the five hundred pairs of cloths (which they had brought), and deposited it in a metal oil-vessel, covering it with another metal oil-vessel, they placed the body of BHAGAWA' on the funeral pile.

At that time the venerable KASSAPO was on his road from *Páwá* to *Kusinárá*, attended by a great priestly retinue, consisting of five hundred bhikkhus: and while the said venerable MAHA'KASSAPO was seated at the foot of a tree, having digressed from the road, a certain individual, who was on his way from *Kusinárá* to *Páwá* passed, having in his possession some *mandárá* flowers. The venerable MAHA'KASSAPO observed him as he was journeying on, at a distance; and having recognized him, he thus accosted him: *A'wuso*, art thou acquainted with our SATTHA'? Yes, *A'wuso*, I was acquainted with him: the said ascetic GO'TAMO' died seven days' ago, and it is from that spot that these *mandárá* flowers were obtained by me. Thereupon among the bhikkhus who were there (with MAHA'KASSAPO), some who had not attained the sanctification of arabathood, wept with uplifted arms,—some dropt as if felled, and others reeled about saying: Too soon has BHAGAWA' died: too soon has SUGATO died—too soon has the *Eye* been closed on the world. But the bhikkhus who had attained arahathood, collectedly and composedly submitted themselves, saying: Transitory things are perishable: how can we in this world obtain it (permanency).

In that congregation, there was at that time one SUBHADDHO*, who had been ordained in his old age. The said SUBHADDHO who had been ordained in his dotage, thus addressed those bhikkhus: *A'wuso*, enough! weep not; bewail not; we are happily rid of that ascetic, (under whom) we were kept in subjection (by being told), this is permissible unto you—that is not permissible unto you—now, whatever we may desire, that we can do; and that which we do not desire, that we can leave undone.

Thereupon the venerable MAHA'KASSAPO thus addressed the bhikkhus: Enough *A'wuso*, weep not, bewail not; why! has it not been emphatically declared by BHAGAWA' himself, saying: even amidst every community of happy and contented persons, various destructive and changeable issues come to pass? *A'wuso*, how can we in this world realize it (permanency). It is not merely by saying of any thing that is born or otherwise produced, which by its perishable nature is transitory, most assuredly it perishes not,—that it will come to pass.

At this instant (at *Kusinárá*) four *Mallian* chieftains, having purified themselves from head (to foot), and clothed themselves in new raiment, said:—We will apply

* His history is given at some length, in different portions of the *Aṭṭhakathá*—he had been a barber in the village *A'tumá*.

the torch to the funeral pile* of Bhagawa'—but were not able to ignite it. Thereupon the *Kusinárá Mallians* thus inquired of the venerable Anurudho: Lord Anurudho, whence, and from what cause, is it, that these four *Mallian* chieftains who are purified from head (to foot), and arrayed in new garments, and who have said: we will set fire to the funeral pile of Bhagawa', have not been able to ignite it? Because, *Wasetthians*, the intention of the *dewatá* is different. Lord, what then is the wish of the *dewatá? Wásetthians*, the venerable Maha'kassapo, attended by a great sacerdotal retinue, consisting of five hundred bhikkhus, is now on his way from *Páwá* to *Kusinárá*, and as long as Maha'kassapo shall not have bowed down, with uplifted hands, at the feet of Bhagawa', so long will the funeral pile of Bhagawa' resist ignition. Lord, whatever be the design of the *dewatá*, be it complied with.

Thereafter, wherever the coronation hall of the *Mallians* might be in *Kusinárá*, thither the venerable Maha'kassapo repaired to the funeral pile of Bhagawa'. On arriving there, so adjusting his robes as to leave one shoulder bare, and with clasped hands having performed the *padakkhinán*, perambulation, three times, round the pile, he opened (the pile) at the feet; and reverentially bowed down his head at the feet of Bhagawa'. The aforesaid five hundred priests, also, adjusting their robes so as to leave one shoulder bare, and with clasped hands, having performed the *padakkhinán*, perambulation, thrice round the pile, likewise, reverentially bowed down at the feet of Bhagawa'. While the venerable Maha'kassapo and these five hundred bhikkhus were in the act of bowing down in adoration, the funeral pile of Bhagawa' spontaneously ignited.

It thus came to pass in regard to the corpse of the Bhagawa' who was consumed by fire: neither his surface skin, nor his under skin, nor his flesh, nor his nerves, nor his muscles deposited any ashes or soot; none (of those parts) of his corpse remained (unconsumed). In the same manner that neither butter nor oil, which is consumed by fire, leaves either ashes or soot—so it came to pass in regard to the corpse of the Bhagawa' who was consumed—neither his surface skin, nor his under skin, nor his flesh, nor his nerves nor his muscles left any residuary ashes or soot: none (of those substances) of his corporeal remains was left unconsumed. All the cloths, composing the five hundred pairs of cloths, were consumed. At the instant that the internal and external parts of the corpse of Bhagawa' were absorbed, streams of water pouring down from the skies, caused (the flames of) Bhagawa''s funeral pile to be extinguished: the flame was thus extinguished by the down pour on the top of the funeral pile of Bhagawa'. The *Kusinárun Mallians* also helped to extinguish the funeral pile by sprinkling every kind of scented water.

The *Kusinárun Mallians* then forming a trelice work with lances, and fencing the place round with their bows (transferred) the remains of Bhagawa' to the assembly hall† (within the town); and for seven days, with dancing and vocal and instrumental music, and with garlands of fragrant flowers, rendered every mark of respect, reverence, devotion and submission.

The *Mágadha* rája Aja'tasattu, the *Wédéhian* descendant, heard that Bhagawa' had attained *parinibbánán* at *Kusinárá;* thereupon the said *Mágadha* monarch Aja'tasattu, the *Wédéhian*, sent an embassy unto the *Kusinarian Mallians*, with this message: Bhagawa' was a kattiyo; and I am also a kattiyo. I am likewise worthy of possessing a portion of the corporeal remains of Bhaga-

* This funeral pile was composed of sandal-wood, and was 120 cubits high.

† The *Aṭṭhakathá* gives a detailed account of the procession which transferred the bones of Buddho, still contained in the metal vessel in which he was burnt, from the coronation hall to the house of assembly.

WA'. I will also erect a *thúpo* over the remains of BHAGAWA', and celebrate a festival.

The *Lichchhawi* of *Wésáli*, as being also of the kattiyo race: the *Sákya* dynasty of *Kapilawatthupura*, as the relations of BUDDHO; the *Balayo* of *Allakappá*, as of the kattiyo tribe; the kattiya dynasty of *Rámagámo*, as of the kattiyo tribe; the brahmans of *Wéṭṭhadípo*, as being of the brahman tribe; the *Mallians* of *Páwá*, as being of the kattiyo tribe;—all lay claim to a portion of the relics of BHAGAWA' in precisely the same terms as the message sent by AJA'TASATTU.

On being thus addressed, the *Mallians* of *Kusinárá* thus replied to the assembly of emissaries: BHAGAWA' died within our territory: we will not give you any portion of his corporeal relics. On this answer being delivered*, the brahman *Dónó* thus spoke to the assembly of emissaries: Beloved, listen to this one observation I am about to address to you: Our BUDDHO was of a most pacific character: it is improper to raise a contest at the moment of the corporeal dissolution of so excellent a being. Beloved, let all of us, willingly, cordially and unanimously, divide the relics into eight portions: many nations are converted unto the *Eye* (BUDDHO)—let *thupá* therefore be extensively built in different regions. They answered: Well, brahman, do then thyself carefully divide the relics of BHAGAWA' into eight equal portions. Replying; be it so, beloved;—the brahman *Dónó* according to the request of that assembly, carefully dividing the relics of BHAGAWA' into eight equal portions, thus addressed that concourse of emissaries: My friends, give me this *kumbhán*, (the vessel with which the relics were measured,) and I will erect a *thúpo* to that *kumbhán*†: and they gave that *kumbhán* to the brahman *Dónó*.

The *Mórians* of *Pipphaliwano* heard that BHAGAWA' had died at *Kusinárá*; and thereupon the *Mórians* of *Pipphaliwano* sent an embassy to the *Mallians* of *Kusinárá* saying: BHAGAWA' was a kattiyo; we are kattiyá, and are also worthy of a portion of the corporeal relics of BHAGAWA': we will erect a *thúpo* over the relics of BHAGAWA', and celebrate a festival. They answered: there is no portion of the relics of BHAGAWA' left: the relics of BHAGAWA' have been divided: take from hence the charcoal of the funeral pile; and they accordingly did take away charcoal.

The *Mágadha* monarch AJA'TASATTU, the *Wédéhian*, built a *thúpo* at *Rájagahan* over the relics of BHAGAWA', and celebrated a festival. The *Wésálian Lichchhawi* built a *thúpo* at *Wésáli* over the relics of BHAGAWA', and celebrated a festival. The *Sákyans* resident at *Kapilawatthu* erected a *thúpo* at *Kapilawatthu* over the relics of BHAGAWA' and celebrated a festival. The *A'llakappa Balayans* built a *thúpo* at *Allakappo* over the relics of BHAGAWA', and celebrated a festival. The *Rámagamian Kósalíyans* built a *thúpo* at *Rámagámo* over the corporeal relics of BHAGAWA', and celebrated a festival. The *Wétthadípian* brahmans built a *thúpo* at *Wétthadípo* over the corporeal relics of BHAGAWA', and celebrated a festival. The *Páwéyun Mallians* built a *thúpo* at *Páwá* over the relics of BHAGAWA', and celebrated a festival. The *Kusinárian Mallians* built a *thúpo* at *Kusinárá* over the corporeal relics of

* The uninjured bones were the following; the four canine teeth—the two collar bones—the frontal bone, with a long hair growing on it, which gave to that relic the appellation of the *renhísa* or hair relic. The rest of the bones were partially injured by the fire. The smallest atoms were reduced to the size of mustard seed; the middling atoms were of the size of half a grain of rice; and the larger atoms were of the size of half a grain of *mugga* seed.

† A measure containing 4 *alhákán*.

Bhagawa', and celebrated a festival. The brahman *Dónó* built a *thúpo* for the *kumbhán;* and the *Pipphalawarian Morians* built a *thúpo* at *Pipphalawano* over the charcoal, and celebrated a festival. Thus there were eight *thúpo* over the corporeal relics; a ninth over the *kumbhán*, and a tenth over the charcoal. This is the origin of this matter, (the erection of *thúpos.)*

The relics of the *Eye* (Buddho) consist of eight *dónáni;* seven *dónáni* are objects of worship in *Jambudípo*, and one *dónán* of the relics of the supreme personage, the *Nága rájas* worsbip in *Rámagámo.* One tooth is the object of worship among the *déwos:* one is worshipped in the capital of *Gandhárá:* another in the kingdom of the *Kálingá** monarchs; the other the *Nága* monarchs worship. It is by his providential interposition that this all-bountiful earth is regulated by the rulers on earth.

Thus unto the relics of Chakkhu (the eye), by those by whom protection ought to be afforded, protection has been fully rendered: and as they (the relics) have received offerings as well from the *déwos, nágas* and kings, as from the great among mankind—bow down therefore unto them with clasped hands;—for the Buddha do not appear even within the term of a hundred *kappá* (of each other).

The termination of the *Mahápariníbbána-Suttan.*

The *Aṭṭhakathá* explains, that before the close of Aja'tasattu's reign, who survived Buddho twenty years, by the advice and instrumentality of Mahákassapo, all these relics, excepting the portion enshrined at *Rámagámo*, were brought to *Rájagahan* for their better protection; where they were all enshrined in a great *thúpo* on the southeast quarter of that city. In the reign of Piyada'os, surnamed Dhammásóka, these relics were again dispersed all over *Jambudípo.* The relics left at *Rámagámo* were predestined for *Tambopanni*, and they were accordingly transfered to *Ceylon* in the reign of De'wánanpiyatisso.—Vide the *Maháwanso.*

II.—*On the spontaneous heating of Brine. By* G. A. Prinsep, *Esq.*

My experiments on the spontaneous heating of brine, which formed an article in the Journal of March last (page 207), have been followed up with a copious series of observations, of which the results will be found in the statements annexed. The present series commences for the most part from the time when (or soon after) the brine was first let into the reservoirs at my salt-works, and embraces, with two or three exceptions, the entire progress of the heating until its partial or complete subsidence. It is therefore remarkable, as the places of trial were also more numerous and the circumstances more various than before, that the maximum temperature observed is 21° Ft. less than in the experiments already brought to notice, and 26° less in the same place, being in the brine at *Narainpore* 142° at the pump, and 137° by the probe in November 1837, and only 116° at the pump and 111° by

* This is the tooth subsequently transferred to *Ceylon.*

the probe in 1838; although the reservoir in question was filled under very similar circumstances both years, and with brine of nearly full saturation to the depth of eight feet, the superstratum of eight feet (in all sixteen feet) being however, when first filled up, much nearer saturation in 1837 than in 1838. But to this difference I attach less importance than to the more rapid extraction of the strong brine from below in June, July, and August, 1838, than in the corresponding months of 1837, when a large proportion of the strong brine remained in the reservoir till the end of the year. It is nevertheless remarkable that the maximum temperature in this reservoir, which so far exceeded that of any other in 1837, was in 1838 even less than the maximum at the bottom of a small reservoir (No. 2) at *Ballya Ghat*, containing only a small portion of strong brine not exceeding two-thirds saturation.

Altogether twelve deposits of brine at the several salt works have been subjected to trial, and, contrary to what might have been expected, the greatest heat (121°) has been found in the smallest mass; namely, in a small pool of *bittern* and salt drainings with superincumbent rain water in a hole dug for a well at *Ballya Ghat:* and this high temperature continued, rather increasing than otherwise, from the beginning of November to the middle of January, when the water was taken out. In all these deposits the brine remained the whole time undisturbed, except in No. 2 of the *Ballya Ghat* series, (till after the 22nd June,) and Nos. 4 and 5 of the *Narainpore* series, whence it was pumped out to supply the salt-boilers, the two latter from June to the 23rd September inclusive, and afterwards No. 5 during all November, and No. 4 from the beginning of December. In every one of them some heating may be discovered; for I now think the temperatures of 91° and 92° in the lower strata of No. 3 of the *Bhaota* series may be regarded as at least 2° or 3° higher than would have been found in an equal mass of fresh water at the same date. But it would seem that the heating scarcely begins to shew itself till the saltness of the water exceeds that of the ocean (S. G. 1028). It would also appear that the heating is most rapid where the greatest differences exist in the saltness of contiguous strata of water; and that it is both accelerated and more quickly terminated by agitation. This will easily be perceived on comparing No. 2 of the *Narainpore* series with No. 1 and 2 of *Bhaota*, and Nos. 1 and 4 of *Ballya Ghat;* the very large diameter and smaller depth of the first causing the contents of that reservoir to be more affected by the wind than those of the other places named. Nevertheless, even in that large reservoir the lower strata, as far as four feet from the bottom, appear

to have undergone no change at all, with respect to the degree of saltness, in seven months from June to January, when, (allowing for an error in the hydrometer which will presently be noticed,) the S. G. was found to be the same as when the water was let in at the end of May and beginning of June.

The tables I now exhibit shew the specific gravities as well as the temperatures in all cases in which the hydrometer was used, and may be thought unnecessarily voluminous on that account. But as the object is to give opportunity to investigate the cause of the heating, I have thought it advisable to suppress nothing; the S. G. columns, though some of them apparently mere repetitions, being to a certain extent a test of the manner in which the probe was charged. Nor have I omitted those trials which turned out unsatisfactory from the probe having been drawn up too soon, or in which error occurred, taking care however to insert a note thereof. The disparity in the number of joints of the probe filled at different trials, in the same depth of water, was owing to greater or less inclination of the instrument.

The probe used in these experiments, instead of the machine before described which was rather inconvenient to handle, was a thick bamboo with a hole cut across at the top of every joint, large enough to admit a small thermometer to try the temperature, and a small hole plugged at the bottom of every joint to draw off the water for trial by the hydrometer. By covering the large holes with soft paper and letting the bamboo remain in the water till the air bubbles (after the bursting of the paper) had ceased to rise, I have procured water of the different strata corresponding with the numbers of the joints, without mixture; but this method occupied so much time that I did not think it worth while to be so particular as to the degrees of saltness, which consequently in the lower numbers will be found registered somewhat below their actual condition, the reduction being in proportion to the depth and specific gravity of the weaker brine near the surface. Each set of salt works was furnished with one of these probes. The *Ballya Ghat* probe was a bamboo with joints of nearly equal length throughout, averaging sixteen inches each. The joints of the *Bhaota* and *Narainpore* probes were more unequal, their several lengths being as follows respectively, measured from the bottom upwards.

Bhaota.		*Narainpore.*	
No. 1	3 feet.	No. 1	11 inches.
2		2	11
3		3	11½
4		4	12
5	2½	5	12½
6		6	13
7		7	14
8	2	8	15
9		9	15½
10	2	10	15½
11		11	15
12	3½	12	15
13		13	15
14		14	15½
15	2½	15	16
16		16	15½
17	2½	17	14
18		18	13½
19	2½	19	12½
20		20	13
	20½ feet.		23 feet.

But great exactness in the specific gravity register during the whole period would have been impossible from the discovery of an error of .009 in the weight of the instrument on the 9th October, which quantity it had lost by constant use since the 17th May: the subsequent observations were corrected accordingly, and care was afterwards taken to compare the hydrometers at short intervals.

It remains for me to notice, that none of the masses of brine tested by the probe in the present series of observations, were under cover; that a fetid smell is usually given out by the brine when pumped up after it has been long in the reservoirs, and that the surface of the water in the long reservoir, No. 3, at *Ballya Ghat* was observed in February and March last, (being then in perfect repose and the depth of water being about 2 feet, the remnant of the supply let in before the rains of 1837,) to assume successively the colors of blue, green, brick-dust red and crimson, but returned to the ordinary appearance of water in a month or six weeks after these changes commenced. The surface of the brine in *Ballya Ghat* reservoir No. 1, the depth of which had been then reduced by *Soonies* to about five feet, was observed a about a week ago to be of a bluish lead colour which did not shew itself before the soonying commenced, and it gives out a strong fetid smell which also was not perceptible before.

Calcutta, 28th January, 1839.

Ballya Ghat.

1.—*Reservoir* 100 *feet long, by* 60 *wide, and* 18 *deep when full; nearly empty till* 1*st June, when brine let in during a storm of wind and rain which filled it to* 11 *feet, and* 5 *feet more were let in on* 5*th and* 6*th June.*

Probe joints	1 June 3. 11 ft. dp.		2 June 12. ft. ins. 15 6		3 June 25. 16 feet.		4 July 4. ft. ins. 16 6		5 July 15. 17 feet.		6 July 29. ft. ins. 17 3		7 Aug. 12 ft. ins. 17 6		8 Sept. 9. ft. ins. 17 6		9 Oct. 31. 18 feet.		10 Nov. 11 17 feet.		11 Dec. 8. ft. ins. 15 6		12 Dec. 17. ft. ins. 15 2		13 Dec. 27. 15 feet.		14 Jan. 27. 5 feet.	
No.	T.	S. G.	T.	S. G.	T.	S. G.	T.	S. G.	T.		T.	S. G.	T.		T.	S. G.	T.	S. G.	T.	S. G.	T.		T.	S. G.	T.	S. G.	T.	S. G.
1	84	1105	87	1110	88	1111	90	1106	88		91	1105½	93½		101	1103	95	1096	103		98		95	1098	92	1102½	78	1107
2	83	1104	87	1109	88½	1110	90		88½		91	1107	94		98	1104	96	1095	103		98		97	1097½	95	—	78½	1106½
3	83	1104	87	1110	89	1110	91	1106	90		93½	1106	98		102	1099½	99	1095	107½		100		199	1097	198	1103	78½	1107
4	84	1104	87	1108	90	1109½	91½	1104½	91		95	1104	99		101	1099	101	1094½	106		101½		100	1095	100	1103	79	1107
5	83½	1104	87	1108	91	1105	92½	1100	93		96	1106	102		102	1098	104	1093	107		103		102	1094	102	1102	79½	1107
6	83	1103	88	1108	91	1103	94½	1100	97		101	1106	105		103	1094	107	1091	108		103		103	1093	104	1100	79	1106
7	88	1102	90	1106	93	1102	95½	1096	101		103	1100	105½		106	1089	110	1090	105		103		104	1090	106	1097	and 6 ins.	
8	89	1101½	91½	1103	93	1098	96½	1091	104		104	1094	105		110	1085	112	1089½	101		100		105	1087	106	1095	..	
9	and 9 ins.		leaked out.		93½	1093	98	1094	99		103	1083	104		114	1088	109	1083	107	1081	99		102	1085	104	1092	..	
10	..		93	1083	93½	1080	101	1084	90		101	1077	102		112	1085	102	1066	87	1041	102		98	1075	101	1087	..	
11	..		93	1069	93	1057	100	1058	89		98	1064	94		103	1068	87	1031	83	1034	92		77	1042	87	1048	..	
12	..		93	1068	91	—	92	1032	1033		90		88		91	1036	83	1028	82		83		74	1041	84	1046	..	
13	..		..		89	1036	and 6 ins.		..		88		87		91	1033	82	1028	81	1033½	80		..		..		..	
14	..		..		..		..		..		88½	1032	87		91	1033	82	1028	..		.		..		..		..	

Nos. 1, 2 and 3 reckoned fair trials, though in No. 3 the probe not steadily put down, but afterwards held firmly awhile to make the temperatures right. No. 4 some mixture in descending. No. 5 held more upright, but doubtful if it reached the bottom. No. 9 supposed half full before the top joint was pushed down. No. 10 not a good trial. No. 11 slow in putting down. No. 12 left some minutes in. No. 13 left 15 or 20 minutes in and a good trial. No. 14 half an hour in—good trial.

N. B. When the S. G. is given for 2 joints together by circumflex, it denotes that the water obtained from the lower joint not being sufficient to float the hydrometer in the tin vessel employed for that purpose, the S. G. is the result of a mixture with water from the next joint. The Bhaota probe sometimes required the mixture of water from 3 or 4 joints of the lower numbers.

2.—*Reservoir* 130 *feet long by* 20 *feet wide and* 4 *to* 6 *feet deep—filled* 5*th June.*

	1		2		3		4		5	6		7	8	9		10		11	
	16th June.		4th July.		15th July.		29th July.		12th Aug.	9th Sept.		6th Oct.	20th Oct.	31st Oct.		17th Dec.		27th Dec.	
	5½ ft. deep.		6¾ feet.		5¾ feet.		6 feet.		6 feet.	6 feet.		6 feet.	6 ft. 6 ins.	6 ft. 4 ins.		4 feet.		3 ft. 10 ins.	
	T.	S. G.	T.	S. G.	T.	S. G.	T.	S. G.	T.	T.	S. G.	T.	T.	T.	S. G.	T.	S. G.	T.	S. G.
1	100	1100	105	1052	106	1095	105	1095	105	119	1140	117	101	100	1093	80	1045	97	1078
2	97	1079	95	1028	91	1039	95	1040	89	103	1063	97	84	84	1022¼	69	1035	84	1043
3	94	—	91	1026½	87	1027	88	1026	87	93	1030	93	83	83	1019½	..		83	1041
4	93	—	and a foot.		87	1027	88	1026	87	92	1028	93	83	83	1019	..		..	
5	and a foot.		..		87	1027	88	1026	and 6 ins.	93	1027	92	83	83	1019½	..		..	
6	..		..		..		..		..	91	1021	..	82	83	1019	..		..	
7	..		..		..		..		..	..		..	81	..		..		..	

No. 1 the second joint registered as "not a good trial." This day the pump was lifting water from the bottom at T. 107 S. G. 1164, and on the 17th at T. 110 S. G. 1170, and on the 22nd at T. 110 S. G. 1107 in which day the fires were put out on account of the weakness of the brine. No. 10 some obstruction here prevented the probe from reaching the bottom.—N. B. the probe was not always put down in the same place in this reservoir.

3.—*Reservoir* 550 *feet long by* 30 *feet wide and* 5 *to* 7 *feet deep,—about one-third full in May, and filled up* 6*th June to* 6 *feet, and a foot more in the rainy months.*

	1		2		3		4		5	6	7		8	9		10		11	12		13	
	June 17.		July 4.		July 15.		July 29.		Aug. 12.	Sept. 9.	Oct. 6.		Oct. 20.	Oct. 31.		Nov. 11.		Dec. 8.	Dec. 17.		Dec. 30.	
	T.	S. G.	T.	S. G.	T.	S. G.	T.	S. G.	T.	T.	T.	S. G.	T.	T.	S. G.	T.	S. G.	T.	T.	S. G.	T.	S. G.
1	97	1064	105½	1059	103	1060	100	1059	104	107	108	1053½	97½	102	1048	103	1048	94	81	1038	91	1045
2	99	1060	106	1056	101	1057	100	1056	103	105½	107	1051	96	101	1044½	100	1046	84	75	1035	80	
3	96	1053	103	1050	97	1053	98	1056	98	103	94	1029	94	97	1039½	89	1026	80	72	1035	80	
4	91	1045	92	1024	90	1028	94	1038	93	97	92	1026	88	88	1020	85	1018	79	72	1035	79	
5	..		and 3 ins.		88	1026	90	1025	90	94½	91	1026	83	82	1019	82	1018	78	72	1034	79	
6	..		..		87	1025	89	1025	87	91	and 9 ins.		81	82	1021	81	1017	78	..		79	
7	..		..		..		89	1025	87	90½	..		80	81	1020	..		S.G.1031	..			
8	..		..		..		..		..	..	..		79½	..		..		..	..			

No. 1 registered as "a good trial." No. 13 also "a good trial," and "left some time in." The probe was not always put in at the same place, and sometimes was slanted towards the middle, (the deepest part,) while at others (as in trial No. 2) it rested near the edge.

4.—*A small pool in a hole dug for a well* 10 *or* 12 *feet deep—half filled in April with bittern thrown away from the boilers, and subsequently filled up by showers of rain carrying into it a little salt from the heaps of saline earth about, and some drainings of brine from the fires.*

	1 Aug. 12.		2 Sept. 9.		3 Oct. 6.	4 Oct. 31.	5 Nov. 11.	6 Dec. 8.	7 Dec. 17.		8 Dec. 27.	9 Jan. 6.	10 Jan. 27.	
	T.	S. G.	T.	S. G	T.	T.	T.	T.	T.	S. G.	T.	T.	T.	S. G.
1	96	1168	96	1179	103	110	103	111	107	1167	107	109	100	1159
2	97	1163	96	1175	106	110	107	116	111	1163	110	110	99	1157
3	99	1122	99	1159	110	112	115	118	116	1152	115	112	77	1098
4	100	1098	103	1146	113	111½	119	116	117	1114	118	116	..	
5	99	1075	105	1125	112	108	118	100	116	1102	121	119	..	
6	95	1046	104½	1095	108	103	110	85	110	1083	117	120	..	
7	92	1025	102	1077	101	—	91	81	92	1058	106	115	..	
8	89	1020	96	——	97	93	81	80	72	1026	91	107	..	
9	88	1020	94	1034	97	87	81	..	71	1025	84	92	..	
10	88	1020	93	1033	96 & 6 ins.	83	80	..	..		..	83	..	
11	..		91	1031	(91-1024)	82	..	..	..		..	81	..	
12	..		..		..	81	..	..	..		.	..	..	
13	..		..		..	81	..	..	..		..	..	..	
14	..		..		..	81	..	..	..		..	..	..	

No. 1 marked as "a pretty fair experiment—probe taken out as soon as filled." No. 2 decidedly better and marked as "sunk a foot deeper." No. 4 "more slanting than in former trial." No. 5 "a good trial." No. 6 supposed not to have reached the bottom. No. 7 a "fair trial." No. 8 "several minutes in." No. 9 probe "some time in." No. 10 "in, several minutes—good trial, say 3 feet deep."

Bhaota.

1.—*Reservoir* 150 *feet diameter and first supplied with brine of half saturation to the depth of* 1 *foot on* 18*th May—and to* 1 *foot* 8 *inches of S. G.* 1135 *on* 31*st May, and to* 9 *feet for the most part of S. G.* 1065 *on* 2*nd June,—to* 12 *feet of ditto on* 4*th, and to* 15 *feet on the* 5*th and* 6*th June, the maximum depth in the rains being about* 17 *feet.*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	June 3.	June 4.	June 7.	July 29.	Sept. 11.	Oct. 7.	Oct. 21.	Nov. 5.	Nov. 16.	Dec. 1.	Dec. 9.	Dec. 17.	Dec. 24.	Jan. 14.
	9 feet.	11½ feet.	15 feet.	15 feet.	16½ feet.	16½ feet.	17 feet.	16½ feet.	16¾ feet.	14 feet.	12 feet.	10 feet.	9½ feet.	8 feet.
	T. S. G.	T. S. G.	T. S. G.	T.	T.	T.	T. S. G.	T. S. G.	T.	T.	T.	T. S. G.	T. S. G.	T.
1	90	91	90	96	98	101	—	98	100	105	102	101	101	96
2	89 } 1087	90 } 1080	90 } 1080	97	98	101	104	97 } 1061	101	104	103	103	101	96
3	89	90	90	98	100	102	105	99	101½	103	102	102	100 } 1080	94
4	89 } 1070	91 } 1070	90 } 1069	98	100	104	105	99	101	101	100	100	97	91
5	90	92	90½	99	100	106	104½	98 } 1056	99	99	98	99½	93 } 1065	90
6	90 } 1067	93 1067	91 } 1068	99	100	106	103	98	97½	98	96	94 } 1063	87½ }	88
7	90	93	91½	100	101	106	101½	97½	96	96	95	91 }	82	84
8	90 1065	93	91 1067	101	102	106	101½	97 } 1053	97	96	94	82 }	80½ } 1053	81
9	90 1065	93½	91 1065	101	101	106	101	97 }	95	95	93	78 } 1050	80	80
10	90 1065	93	91 1062½	101	101	105	99 1053	97 } 1051	94½	87	90	78	80 }	79
11	90 1065	92¾	91¼ 1063	101	101	103	99 1053½	96 }	94	84	82	77 } 1048	80 } 1053	77½
12	..	93	91½ 1063	98	100	94½	98 1051	90 —	88	82	80	77 }	80	77
13	..	93 1065	91 1049	93	98	93	88 1029	86 1031	83	81	80	..	..	78
14	..	..	91 1041	90½	94	93	85	86 } 1029	82	80	80	..	..	80
15	..	..	91 1040	90½	89	93	84	86 }	82	80	80	..	..	82
16	..	..	91 1039	92	87	93	84	86 1028½	82½	..	80 }	..	..	..
17	..	..	..	..	88	93½	84	86 } 1028	82½	..	1041 }	..	..	..
18	..	..	..	..	88	..	86	86 }	82½	..	..	..	..	..
19	..	..	..	..	88	..	..	86	83	..	..	..	..	..

No 2 during this trial water was brought up by a bottle from about a foot above the ground at the bottom of the Reservoir, of T. 89 and S. G. 1097. No. 3 " a good trial." No. 4 " not a very good trial, the probe having been lifted after being filled so as to raise the lower numbers and sink the top to No. 19 for half a minute." No. 7 " good trial." No. 10 " very little slant—left a few minutes in, and a pretty good trial." No. 12 " good trial—some minutes in." No. 13 " in, some minutes." No. 14 " very slanting, say 40°—half an hour in, and a good trial"—tried at 4 p. m. after a sunny day. N. B. probe put down at different places, always near the wall, and sometimes with considerable slant.

2.—*Reservoir* 54 *feet long by* 27 *feet wide, never empty since May,* 1837, *and having* 4 *to* 5 *feet of water of S. G.* 1040 *to* 1050 *in May,* 1838, *but filled to* 9 *feet early in June, with water of* 1030 *to* 1040, *the maximum depth in the rains being* 10 *feet.*

	1 Oct. 7. T.	2 Oct. 21. T.	S. G.	3 Nov. 5. T.	S. G.	4 Nov. 16. T.	5 Dec. 1. T.	6 Dec. 9. T.	7 Dec. 24. T.
1	104	103		99		102	106	101	—
2	104½	103		101		104	106	102	101
3	106	106		103		105	108	102	101
4	107	106		102		106	105	99	98
5	108	104		101	1049	105	99	95	95
6	107½	102	1044	98	1036	100	90	85	89
7	105	98		93	1026	95	85	82	83
8	103	94	1020	84	1011	88	80	77	80
9	97	86		84		82	80	75	78
10	93	84		84		80	79½	75	77
11	93	84		84		81	..	75	77½
12	93½	84½		and 1 foot.		81	..	77	77
13	93½	85		..		81	..	..	..
14	..	87		..		..	..	..	.

No. 2 "good trial." No. 4 "good trial." No. 5 "little slant, and left in a few minutes—a pretty good trial." No. 7 "in, some minutes, and more slanting than usual." No. 6 "good trial, some minutes in."

3.—*Reservoir* 100 *feet long by* 20 *feet wide and* 5½ *to* 6 *feet deep; a foot of water let in* 18*th May, and* 4 *feet more* 5*th and* 6*th June.*

	1 Sept. 11. T.	S. G.	2 Oct. 21. T.	3 Nov. 5. T.
1	91		86½	86½
2	92		86	86½
3	91	1032	86	86
4	90		85½	85
5	90		84	85
6	91		85½	85½
7	90		86	85
8	90		87	85
9	88		87	84
10	88	S. G. 1012	86½	S. G. 1014 84
11	88		..	..
12	88		..	..
13	86	1024	..	..

No. 2 "good trial."

Narainpore.

1.—*Reservoir* 150 *feet diameter, half excavated to* 16 *feet and half to* 6 *feet deep—walled round the deep side : filled to* 9 *feet between the* 12*th and* 15*th June, to* 15 *feet by the* 25*th June, and one foot more during the rains.*

	1 June 17.		2 July 24.		3 Sept. 11.		4 Oct. 7.		5 Oct. 21.	6 Nov. 5.		7 Nov. 16		8 Dec. 1.		9 Dec. 18.	
	T.	S. G.	T.	S. G.	T.	S. G.	T.	S. G.	T.	T.	S. G.	T.	S. G.	T.	S. G.	T.	S. G.
1	93	—	92	1090	93	1090	95	1092	88	90	1083	89		90	1083	—	—
2	89	—	92		93		96		90	92		89		89		—	—
3	88	1111	93½	1090	93	1085	96	1088	91	92	1081	89	1085	92	1084	94	1088
4	88	1112	93½	1090	94	1087	97½	1088	92	93	1083½	90		92	1083	94	1088
5	88	1111	95	1085	95	1087	100	1088	92	94		92	1087	94	1083	95	1088
6	89	1111	95	1075	96		101	1085	95	95	1083	93	1088	94	1079	97	1088
7	90	1110	95	1065	97	—	102	1077½	92	96	1080	93½	1084	94½	1074	93	1085
8	90	—	95	1058	100	1080	101½	1068	98	97½	1072	95	1080	95	1072	100	1079
9	89	1109	92	1056	101	1070	100	1060	98	97	1063	97	1076	95½	1066	101	1072
10	89	1109	90½	1049	102	1067	98	1050	97	96½	1053	97	1069	93½	1056	99	1062
11	..		87½	1046	101	1050	94	1045	95	95	1046	97	1059	93	1051	91	1061
12	..		88	1040	97	1045	91	1030	89	92	1038	96	1051	89	1036	80	1038
13	..		..		91	1030	91	1026	79½	87	—	92	1041	84	1034	75	1034
14	..		..		90	—	90	1025	79	82	1019	83	1026½	78	1025	69	1033½
15	..		..		90	1028	..		79½	82	1016	77	1043	75	1021		
16	..		..		and 6 inches		..		79½	82	1016	77	1029	74	1021	..	
17	..		..		..		..		..	..		78	1018	73½	1021	..	
18	..		..		..		..		..	..		..		73	1023	..	

No. 5 appears to have been tried in a hurry and therefore shews the temperatures (except near the surface) lower than they would have appeared if the probe had been suffered to remain a few minutes in. No. 8 registered as "soon taken out." No. 9 "fair trial." N. B. One foot let off between trials 5 and 6—1 foot more between 6 and 7—1 foot more between 7 and 8, and 2 feet between 8 and 9—the maximum depth being on the 21st October.

2.—*Reservoir* 300 *feet diameter, with* 4 *feet of last year's brine remaining in on* 15*th May of S. G.* 1074 : *filled to* 9 *feet between* 5*th and* 10*th June, to* $10\frac{1}{2}$ *feet by* 24*th July, and to* $11\frac{1}{2}$ *feet (the maximum) by* 21*st October.*

	1 July 24. $10\frac{1}{2}$ feet.		2 Sept. 11. 11 feet.		3 Oct. 7. 11 feet.		4 Nov. 5. 11-4.		5 Nov. 16. 11-3.		6 Dec. 1. 11	7 Dec. 18. 10-8.	8 Jan. 15. 10-5.
	T.	S. G.	T.	S. G.	T.	S. G.	T.	S. G.	T.	S. G.	T.	T. S. G.	T. S. G.
1	95	1085	106	1082	107	1086	97	1073	96	--	92	90 1080	92 1081
2	97		109		107		$97\frac{1}{2}$		97	1077	93	91	$92\frac{1}{2}$
3	99	1085	109	—	$107\frac{1}{2}$	1086	98	1074	97	1076	93	93 1081	$91\frac{1}{2}$ 1081
4	102	1085	110	1083	$107\frac{1}{2}$	1085	98		97	1076	94	93 1079	91 1080
5	105	1086	110	1080	$107\frac{1}{2}$		99	1075	96	1075	93	93 1079	91 1077
6	105	1086	106	1075	$105\frac{1}{2}$	1077	98	1074	94	1071	89	91 1077	87 1069
7	104	1083	101	1064	$100\frac{1}{2}$	1063	93	1065	89	1058	84	81 1064	80 1060
8	99	1075	101	1063	99	1058	92	1056	88	1053	80	80 1059	78 1058
9	91	1069	93	1044	94	1047	90	1051	80	1039	77	75 1057	76 $1057\frac{1}{2}$
10	90	1066	91	1037	92	1040	83	1036	80	—	77	75 1054	$76\frac{1}{2}$ $1056\frac{1}{2}$
11	88	$1055\frac{1}{2}$	91	1036	$91\frac{1}{2}$	1038	83	$1034\frac{1}{2}$	80	—	77	75 1050	76 1055
12	85	$1037\frac{1}{2}$	91	1036	91	1038	$82\frac{1}{2}$	$1035\frac{1}{2}$	80	1040	76	..	..
13	85	1039	..		..		82	1034	..		..	..	..
14	85	1040	..		..		..		..		..	..	..

No. 7 the best trial, the probe having been "left in full half an hour." In the other trials, at this reservoir, it was generally taken out very soon after being charged. No. 8 a very good trial; the probe left in nearly two hours. Water taken from the surface was at the same time (10 A. M.) T. 73 S. G. $1053\frac{1}{2}$.

3.—*Reservoir* 250 *feet long by* 15 *feet wide, filled to* 6 *feet deep between the* 10*th and* 30*th June, and a foot more by rain by the* 21*st October at the maximum.*

	1 August 4.	
	T.	S. G.
1	101	1075
2	103	
3	$103\frac{1}{2}$	1066
4	102	1057
5	99	1045
6	92	1032
7	90	1030
8	$89\frac{1}{2}$	—
9	$89\frac{1}{2}$	1030
10	89	1029

One side of this reservoir is walled, so that the water of the adjoining terraces passes freely over to the depth of a foot during the rains, at the maximum depth of water then on the latter.

4.—*Reservoir* 120 *feet diameter, dry in March, with salt then forming on the mud at bottom—*1 *or* 2 *feet of brine in at S. G.* 1150 *on* 1*st May,* 4 *feet of S. G.* 1165 *on* 6*th May,* 6 *feet of S. G.* 1185 *below and* 1155 *at top on* 22*nd May,* $8\frac{1}{2}$ *feet of S. G.* 1191 *on* 31*st May,* $11\frac{1}{2}$ *feet (surface S. G.* 1109*) on* 10*th June,* 15 *feet (surface* 1040*) on* 26*th June, and* 16 *feet at the maximum, say on* 21*st October.*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	May 20.	May 26.	May 31.	June 4.	June 7.	July 16.	Aug. 4.	Sept. 11.	Oct. 7.	Oct. 21.	Nov. 5.	Nov. 11.	Nov. 21.	Dec. 1.	Dec. 18.
		6 feet.	$8\frac{1}{2}$ feet.	9 feet.	8 feet.	$15\frac{1}{2}$ feet.	$15\frac{1}{2}$ feet.	15 feet.	$15\frac{1}{2}$ feet.	16 feet.	15 feet.	14 feet.	12 feet.	$11\frac{1}{2}$ feet.	$10\frac{1}{2}$ feet.
	T. S. G.	T. S. G.	T. S. G.	T. S. G.	T.	T. S. G.	T. S. G.	T. S. G.	T. S. G.	T.	T. S. G.	T. S. G.	T. S. G.	T. S. G.	T. S. G.
1	110 1170	110 1183	98 1200	99 1194	$98\frac{1}{2}$	99 } 1176	104 } 1162	104 } 1118	105 } 1088	102	109 } 1101	108 —	107 —	110 } 1111	106 —
2	107 —	104 1183	98 1197	98 —	$98\frac{1}{2}$	100 }	105 }	105 }	106 }	105	110 }	110 } 1094	108 } 1088	111 }	107 1105
3	104 1156	103 1180	98 1196	98 1195	$98\frac{1}{2}$	98 1145	107 1160	107 1105	109 } 1091	107	111 1092	111 }	109 }	111 1096	104 1097
4	100 1145	98 1177	$97\frac{1}{2}$ 1196	98 1197	99	101 1115	$107\frac{1}{2}$ 1120	108 1103	110 }	107	111 1084	110 1087	109 1079	110 1091	100 1090
5	..	94 1170	98 1196	98 1197	99	101 1110	107 1115	108 1093	109 } 1075	106	109 1075	110 1078	109 1079	109 1081	94 1079
6	..	93 1173	98 1195	98 $1195\frac{1}{2}$	100	102 1110	110 1103	109 1086	108 }	104	107 1066	108 1067	107 1071	105 1073	81 1045
7	..	..	98 1195	99 1194	101	104 1101	110 1085	108 1078	105 1058	100	103 1060	105 1055	103 1058	97 1059	77 1035
8	..	..	98 1195	100 $1192\frac{1}{2}$	97	102 1087	109 1075	106 1062	103 1045	92	98 1040	100 1042	95 1039	84 1026	72 1034
9	..	..	94 1189	96 1179	88	$95\frac{1}{2}$ 1083	103 1055	101 1048	98 1035	81	89 1025	89 1022	84 1021	79 1023	72 $1033\frac{1}{2}$
10	..	..	..	and 8 ins.	& 8 ins.	$86\frac{1}{2}$ 1048	93 1045	94 1032	93 1029	80	85 1018	85 1021	$81\frac{1}{2}$ 1020	76 1023	71 —
11	..	..	..	..	..	86 1037	90 1034	91 1028	91 1028	80	83 1019	83 —	$80\frac{1}{2}$ 1019	76 1023	..
12	..	..	..	..	..	85 1037	88 1033	$90\frac{1}{2}$ 1028	90 1027	80	83 } 1016	$82\frac{1}{2}$ —	$80\frac{1}{2}$ $1019\frac{1}{2}$	76 } $1022\frac{1}{2}$	..
13	..	..	..	..	..	1037	88 1031	90 1028	90 1025	$79\frac{1}{3}$	$82\frac{1}{2}$ }	84 —	80 1019	76 }	..
14	..	..	..	..	..	1033	88 —	90 1028	90 1025	80	83 1016	..	..	..	..
15	..	..	..	..	..	..	..	..	90 —	80	83 1016	..	..	..	..

No. 6 an omission of two joints of the probe occurred in this trial of the temperatures, probably somewhere after the 7th or 8th. No. 7 here a similar omission occurred of one joint in trying the specific gravities. No. 11 is registered as a "pretty fair trial." No. 12 "fair trial"—about a foot let off from the surface since 1st November. No. 13 "good trial, but very upright." No. 14 "very upright, but many minutes in." No. 15 "left some minutes in."

5.—*Reservoir* 120 *feet long by* 40 *feet wide, dry in March,* 1 *foot of water in at S. G.* 1120 *on* 1*st May,* 1 *foot of S. G.* 1140 *on* 24*th, and* $8\frac{1}{2}$ *feet of S. G.* 1197 *on* 31*st May,* $8\frac{1}{2}$ *feet* 4*th June,* $7\frac{1}{2}$ *feet on* 7*th June,* $11\frac{3}{4}$ *feet* 10*th June, (surface S. G.* 1098,*)* $14\frac{1}{2}$ *feet on* 26*th June (surface S. G.* 1035*) and* $15\frac{1}{2}$ *feet at the maximum in the rains.*

	1		2		3		4	5		6		7		8	9		10	11		12		13	
	May 26.		May 31.		June 4.		June 7.	July 16.		Sept. 11.		Oct. 7.		Oct. 21.	Nov. 5.		Nov. 11.	Nov. 21.		Dec. 1.		Dec. 18.	
	6 feet.		8 feet.		9 feet.		$7\frac{1}{2}$ feet.	15 feet.		15 feet.		15 feet.		$15\frac{1}{2}$ ft.	15 feet.		14 feet.	12 feet.		$11\frac{1}{2}$ feet.		10 feet.	
	T.	S. G.	T.	S. G.	T.	S. G.	T.	T.	S. C.	T.	S. G.	T.	S. G.	T.	T.	S. G.	T.	T.	S. G.	T.	S. G.	T.	S. G.
1	96	1185	98	1205	97	—	$97\frac{1}{2}$	$96\frac{1}{2}$	1190	104		105	1120	101	102	1086	—	100	—	102	1076	98	1080
2	96	1182	98	1205	97	1206	98	97		105	1105	106		102	106		106	103	1077	103		—	—
3	97	1184	98	1205	98	1205	98	99	1168	106		108	1098	105	107	1079	107	104		102		96	1067
4	96	1181	98	1206	98	$1205\frac{1}{2}$	98	99	1125	106	1090	110		$105\frac{1}{2}$	108		108	104	1068	101		98	1063
5	95	1183	98	1205	98	1205	99	100	1110	107	1085	111	1082	107	108	1071	108	103	1062	98		88	1058
6	95	1183	98	1210	99	1205	100	100	1106	108	1080	111	1073	107	$107\frac{1}{2}$	1066	106	102	1058	96		84	1047
7	..		98	1206	100	1201	101	$101\frac{1}{2}$	1102	$107\frac{1}{2}$	—	110		106	107	1058	104	100	1054	96		78	1036
8	..		97	$1203\frac{1}{2}$	101	$1198\frac{3}{4}$	97	104	1090	107	1067	108	1059	104	106	1054	102	96	1046	84		76	$1034\frac{1}{2}$
9	..		89	1186	96	1183	90	105	1071	103	1055	103	1045	100	100	1046	94	85	1023	81		73	—
10	..		..		90	—	& a ft.	104	1062	97	1042	94	1030	91	88	1021	85	$82\frac{1}{2}$		77		74	1033
11	..		..		..		..	104	1045	93	1033	92	1028	82	85	1018	84	81		75		74	$1033\frac{1}{2}$
12	..		..		..		..	99	1043	91	1030	90	1027	80	83	1018	84	78		74		..	
13	..		..		..		..	97*	1036	90	1030	90	1027	80	83		84	79		..		..	
14	..		..		..		..	87	1031	89	1030	90	1027	$79\frac{1}{2}$	83	1018	85	79		..		..	
15	..		..		..		..	* qr. 87.		90		..		80	83	1018	..	..		..		..	
16	..		..		..		..	..		..		..		80	..		..	..		..		..	

Nos. 9 and 10 registered as "fair trials." No. 11 "slow in putting down the first joints." No. 12 "very upright." No. 13 "fair trial."

Tenasserim
Sourin's Id.
Blundel's Id.
Saddle Id.
Smart's Id.
Sir Charles Metcalf's Id.
Greenlaw's Id.
Warden's Id.
Bayley's Id.
Chester's Id.
Lloyd's Id.
H. Prinsep's Id.
Sargent's Id.
Mackenzie's Id.
Observation
Court's Id.
Sir John Hayes Id.
Fletcher's Id.
Torres Id.
Lord Wm. Bentinck's Id.
Kings Id.
Plantain Id.
Thomouk
Kyoukmia
Kadwyen
MERGUI
Byiktoung
Great Tenasserim R.
Plains
TENASSERIM Town
Wild Elephants
Mergui Id.
Auckland Bay
Morrison Bay
Sellore
Pigeon Id.
Kisheraing
Whale Bay
Lingah is situated 2 Tides up this River
Domel Id.
Maria's Id.
Eliza's Id.
Jane's Id.
Anne's Id.
High Peaked
Bushby's Id.
Charlotte's Id.
Sir Jn. Malcolm's Id.
Sir E. Owen's Id.
Sir C. Malcolm's Id.
Cheding A Malay village
Boping or Bokpaleng of the Siamese
Collie's Id.
11° N. L.
Sullivan's Id. or Lampee
Chenanghan
Champoon
Saiopa or Patchan R.
St. Matthew's Id.
Scale, 16 Miles to an Inch.
Oriental Lith. Press - Calcutta
L. 98° E. G.
99°

PUMP REGISTER.

Ballya Ghat. Brine Reservoir No. 2.

16 June,	T. 107	S. G.	1164	from the bottom.
17 ,,	,, 110	,,	1170	
22 ,,	,, 110	,,	1107	

Narainpore. Brine Reservoir No. 4.

10 May,	N. W. pump	T. 111	S. G.	1171	from 6 inches below surface.	
,, ,,	S. W. ,,	,, 112	———		from 1 foot ditto.	
	Total depth of water about 3 feet—surface T. 98 S. G. 1133.					
15 ,,	N. W. pump	T. 102	S. G.	1104	fixed as before.	
,, ,,	S. W. ,,	,, 116	,,	1170		
20 ,,	,,	,, 114	,,	1170		
22 ,,	,,	,, 108	,,	1180	ditto, depth of water 6 feet, surface [T. 92 S. G. 1153.	
4 June,	N. E. ,,	,, 102	,,	1196		
	N. W. ,,	,, 102	,,	1193		
7 ,,	N. E. ,,	,, 103	,,	1193		
26 ,,	,,	,, 104	,,	1199		
16 July,	,,	,, 105	,,	1165		
24 ,,	,,	,, 105	,,	1198	from 12 feet below surface.	
4 Aug.	,,	,, 108	,,	1148	sunk a foot lower.	
11 Sept.	S. E.	,, 113	,,	1142	from near the bottom.	
9 Dec.	S. W.	,, 114	,,	1161		
18 ,,	,,	,, 110	,,	1152		
31 ,,	,,	,, 111	,,	1149		
15 Jan.	,,	,, 113	,,	1125		

Narainpore. Brine Reservoir No. 5.

4 June,	S. E. pump	T. 101	S. G.	1201½	
7 ,,	,,	,, 105	,,	1200	
26 ,,	,,	,, 101	,,	1158	
4 July,	,,	,, 102	,,	1118	
24 ,,	S. W.	,, 103	,,	1128	from near the bottom.
4 Aug.	,,	,, 104	,,	1126	
11 Sept.	,,	,, 105	,,	1187	
5 Nov.	N. W.	,, 109	,,	1121	sunk a foot lower so as almost to touch the bottom.
11 ,,	,,	,, 108	,,	1107	
16 ,,	,,	,, 108	,,	1101	

III.—*A short notice of the Coast-line, Rivers and Islands adjacent, forming a portion of the Mergui Province, from a late survey. By Captain* R. LLOYD.

The outer islands lying off this coast, with part of the main land, were laid down by Captain D. Ross of the Indian Navy, from observations made between the years 1827 and 1830, and the result of the present survey has been to fill up the inner portion of it, to delineate the coast-line (with the exception of a very small and unimportant part) between the latitudes of 9° 50′ N. and 12° 40′ N., and to make a sketch of the *Tenasserim* river, or "*Tenanthari myit*" from its entrance up to the old town of that name.

Within these limits, the general features of the country are much the same as in the province of *Arracan*, being mountainous in the interior,

of irregular outline, and consisting of several ranges, clothed to their summits with large forest trees ; the greatest elevation reached may be taken at about 3500 feet.

Between the southern limit and 11° 40′ N. the high land approaches in some parts very near to the sea, but from that latitude to the northern limit, it is fronted by a low delta of mangrove country, varying in breadth from 5 to 15 miles. Through this several small rivers have their course, and communicate with each other by creeks forming an inland navigation for boats ; the outer portion of this country from being so low, and tide-washed, is unfit for purposes of cultivation, in its present state, and it is only in the inner part, where there begins to be a susceptible rise in the level towards the high land, that there are a few cultivated spots.

Within this delta or *Sunderbund* there are several small elevated ridges and isolated hammocks, covered with large trees growing upon a soil covering a rocky basis, and which at some remote period, appear to have been separate islands forming a portion of the archipelago, but are now united to each other by the accumulation of deposit brought down by the different streams from the higher grounds, and which seems to be gradually encroaching seaward. In this manner an island called "*Sellore*" has evidently become connected with the main by a narrow neck of land covered with mangroves and having two or three creeks intersecting it, and another one "*Kesseraing*" appears to be approaching that state. These islands being large, and sheltering the inner waters, the tides set round both ends and meet in the middle, facilitating the deposit of sediment, and assisting this operation of nature.

Of the small streams above alluded to, the *Tenasserim* or "*Tenanthari* river" is the only one of any consequence, one branch of which discharges its waters at *Mergui*, and forms the harbour of that place, while the other disembogues about seven miles further to the southward : these two branches unite nine miles above *Mergui*, opposite a small village called *Tedawon ;* here the features of the country begin to change from a low mangrove land to one of moderate elevation, and the river opens out into a lake of small extent, apparently the original mouth of it, in which are situated two or three small islands, and on either side are several hill pagodas and small villages which have a very pretty effect. At one of these "*Mounglaw*," on the left bank, there are extensive plains for rice cultivation, and beyond this, the country becomes mountainous to the very edge of the river, with a considerable narrowing of its bed : here and there however, there are spots of level ground which are occupied by small villages, whose occupants cultivate grain and other produce, little exceeding what is required for their own

consumption. Four miles above *Mounglaw* on the right bank, a small branch or creek runs off to the northward, which after receiving the waters of several other streams, gradually enlarges itself until it falls into the sea three miles to the northward of *Mergui*, and forms the land on which that town is situated into an island. About nine miles further up on the left bank is a similar but rather larger offshoot the *Thuhwa*, which falls into the sea in 12° 10′ N. Beyond this at the distance of about 14 miles is the old town of *Tenasserim*. It is situated where the river divides into two branches, the great and little *Tenasserim*, opposite to the point of confluence, and on the left bank of the latter. The river is 115 yards wide abreast of the town, and the depth of it in the latter end of May was three fathoms at low water in the centre of the stream: the rise and fall of tide at the springs was six feet, and it was high water at about three hours, the velocity of the stream was very weak, not exceeding one mile per hour. The natives describe the water as being fresh all the year round, and the surface of the river as being bodily raised about nine feet during the period of the freshes, (or from July to September.) The bed of the river is very variable and irregular both in tenacity and depth, and there are several shallows, and rocky patches; the high land too coming down in many places close upon its banks, renders it difficult to navigate; but small vessels, such as the river sloops of *Calcutta*, by waiting for the tide to drop up with, and to cross the different shallows, may be taken to *Tenasserim*, should Dr. Helfer's coal discovery render it necessary at any future period.

The position of *Tenasserim* has been very inaccurately placed in all our old maps, and its distance by the course of the river from *Mergui* is very much exaggerated; this may have been caused partly from the position assigned to the latter being that of two islands of the same name in latitude 12° 12′ N. instead of the correct position of the town itself. During my visit to *Tenasserim*, the sun was too vertical to obtain a meridian altitude by artificial horizon, and the night was so cloudy and unfavorable that I failed in obtaining the latitude by a star. Captain Macleod however, whom I have reason to consider a good observer, made it in 12° 6′ N. and using that latitude I made the longitude by chronometer 35 miles east of *Mergui*, or in 99° 3′ east, and by a sketch of the river it is 40 nautic or 46 statute miles from the entrance.

Whatever may have been its former extent and importance, it is now a very insignificant place, and I should think does not contain more than 100 houses and 4 or 500 inhabitants: nor does it bear much

appearance of former consequence, there being only two or three small pagodas, and the remains of an old brick outwork running along the brow of a hill on the south side of the town. It produces but little for export, but the Shans bring a quantity of elephants' tusks and rhinoceros' horns for sale, and occasionally rubies and other precious stones may be procured but of inferior value; there is also said to be a concealed trade in gold dust, which with other traffic is in the hands of the Burmese and Chinese. During my visit here, the head-man of the town was absent, and I could gain but little information.

The other rivers within this delta, and communicating with each other, are small, and unfit for the general purposes of navigation, and not being of any importance as leading to villages, it will be sufficient merely to enumerate them. They are the "*Wayaung taung myit*," the "*Thuhwa*," the "*Nayaza myit*," "*Megyaung yethonk myit*," "*Kapo myit*," *Kyauk phyu myit* and the *Kopha nein myit*, ("*myit*" means river.)—The opening to the last named is spacious, and receives the waters of *Linya* river or creek, which leads to a village of the same name, situated by native accounts about 30 miles up. There is here said to be an extensive country capable of being brought under cultivation, sufficient for the support of a much larger population, than the few Shans who inhabit it. I regretted much that I could not visit this place, as a correct delineation of its position might show it to be very near the coal fields of Dr. Helfer which are in lat. 11° 53′ N. and long. 99° 30′ E.: and this leads me to doubt whether the locality in question, is in the British or Siam territory: for *Cin* point of the charts on the gulf of *Siam* side, is in lat. 12° 10′ N. and long. 100° 10′ E., or only about 35 miles in a direct line from the coal site, whilst from the town of *Cin* situated in a more southerly direction, where the gulf of *Siam* is represented as having a deep course to the westward, it is only 23 miles.

The entrance to *Linya* river is in lat. 11° 40′ N. and long. 98° 50′ E., and off the opening leading to it and to the "*Ko-pha nein myit*," there is a spacious place for anchorage, to which vessels could have no difficulty in proceeding, and which I have called *Whale Bay*, from the circumstance of its being resorted to by numerous whales, and it is the only part of the coast where I have seen them.

To the southward of *Whale Bay*, the features of the coast begin to assume a different character; the shore is high and rocky close to the sea, with only occasional patches of mangrove in the vicinity of, or at the entrances of small rivers; here also the inland navigation ceases, for none of these streams so far as I could learn, have any communi-

cation with each other, and the boats proceeding to the southward go outside.

In lat. 11° 28′ N. there is rather a large opening in appearance called "*Ye-ngan Wa*," which is said to reach a long way into the interior; it however suddenly contracts its breadth, and does not lead to any village. On a headland in lat. 11° 23′ N. stands "*Chadon*," or "*Sading*," the only village which is situated on the sea coast; it is of recent origin, having been established by the exertions of Mr. Commissioner MAINGY, five or six years ago. This gentleman induced a Malay of some consequence with his followers to settle here, in hopes that it might serve to increase the population of the country, and bring it more extensively under cultivation. How far the good intentions of Mr. MAINGY have been realized is very questionable, for the Malays are far from being an industrious or agricultural people, and the head-man of the village, "DATOO JUAN," from his former mode of living was very unlikely to be the instrument of much good. The site which the old chief has selected for his village is ill chosen for agricultural pursuits, there being but little land in its immediate vicinity that could be brought under cultivation without much labor and expense, and the only advantage it seems to possess is a commanding and overlooking position towards the sea: it is however well adapted for fishing, by which the people principally subsist. It is true, there is the appearance of much exertion having been made at the first settling of the place, by felling large trees, and clearing away the ground, but the attempt has been given up as hopeless or distasteful, and all is growing into jungle again, except where the village itself is situated, which contains only about 50 houses and 200 inhabitants. "DATOO JUAN" is a carpenter by trade, and has built two or three boats of about 50 tons each, which he has finished in a very good style: they are ostensibly for the purpose of cruising amongst the islands, part of which he farms from government, for the purpose of collecting edible birds-nests, bich de mer, &c. and for taking the produce to *Penang* and other markets: but that he may have other objects in building these fine boats, is not unlikely, and that he still continues to have some turn for his old predatory habits, when time and opportunity may offer, I am rather inclined to suspect, and therefore during my employment in his neighbourhood I made a point of cultivating a good understanding with him, by making a few presents, which policy had its advantages, for the old man was always friendly, and ready in supplying me with such stock as his village afforded, and on one occasion in particular I should have been put to much inconvenience, had it not been for a timely supply I received from him.

Four miles to the southward of *Sading* is the entrance to *Bokpur* creek leading to a village of the same name about seven or eight miles up. Here there is an extensive field for cultivation, and the soil is apparently rich, but the population (chiefly Shans), is extremely scanty, and is scattered over some extent of country in little villages, which together with those about *Linya*, may be estimated to contain about one thousand inhabitants. The people describe *Bokpur** as having been thickly populated at one time, and the country very extensively cultivated, and the appearance in its vicinity rather corroborates this: it is much to be regretted that there is not a more industrious and extensive population located here.

I attempted to ascend a high hill overlooking *Bokpur* accompanied by 20 or 30 Shans to cut a path, in order to obtain an extensive view of the coast and islands, for the purpose of fixing its geographical position more correctly, but it came on to rain in such torrents that I was obliged to give it up. The mouth of *Bokpur* creek is dry at low water for some distance seaward, and two or three miles from the entrance it divides into two branches, that to the southward leads to the village, off which it dwindles to a stream only 10 yards wide, with sufficient water for very small boats only. To the southward of *Bokpur* creek about 10 miles is a very extensive group of small rocky islands, most of which I have laid down, but what may be considered the coast line within them, I was unable for want of time to complete. The survey however is incomplete for a very small and unimportant space, about four or five miles only, where the high land approaches so very near the sea, that the streams, if any, only deserve the name of creeks. Proceeding on to the southward, and between the parallels of 10° 20′ and 10° 30′ N. are two small rivers which by information I obtained afterwards, are called "*Chenanghan*," and "*Champoon*:" the latter or southern one appeared the largest, but this part of the coast having but few islands off it, and being much exposed to the sea during the S. W. monsoon, I was prevented doing more than fixing their entrances pretty correctly by means of angles as I passed. The latter stream is, I imagine, the *Sarannah* river of the old charts, up which I rather think there is a village called "*Champoon*," where tin is produced. If so it may deserve inquiry whether there is here any communication with the river and place of the same name on the gulf of *Siam* side. There is no decided termination of the principal range of mountains, running along the *Isthmus*, into a low land, so as to favor such a conclusion, but when it is considered how deceptive the appearances of a country are when viewed from a distance it is impossible to say, until actual examination

* In the map this place is written *Boping* or *Bokpaling*.

of the locality takes place, that, like the *Tenasserim* river, winding their course round the base of hills and through a mountainous country, some of these streams may not so approximate to each other, as to make communication with the gulf of *Siam* side, easier and shorter in this part than in any other. The last and only river which I have to notice is situated opposite the island of *St. Matthews*, and which I consider to be the *Sa-kopah* or *Pak-Chan* forming the southern limit of our territory. Its entrance is in lat. 9° 58′ N. and, from the anchorage inside *St. Matthews*, it is completely hid from view by a group of small islands in shore. The extensive flat lying off the coast here, led me however to believe that there was a large opening in its vicinity, and I proceeded to examine the locality in the vessel's boat, when after crossing the flat and rounding the group of islands spoken of, I was gratified by coming suddenly upon the entrance to the river, which is a noble stream having 8 or 10 feet depth of water in it, and being about one and a half miles wide, for seven or eight miles up, beyond which I had not the means of continuing my examination. The direction of the river thus far was about N. N. E. or nearly parallel with the coast, and its course lay between two ranges of hills of 5 or 600 feet elevation. I am however rather disposed to think that the entrance to it will be found to be intricate; but further and minute examination may prove the contrary. That this river must be the one forming our boundary appears to me evident, as there is no other answering the description: but unfortunately I had no person on board who was acquainted with the locality, nor had I any interpreter, having been disappointed in both, by not being able to bring on a small tender and pilot I had engaged to accompany me, owing to the violence of the weather. Under these circumstances, even if it had come particularly within the object of my inquiry, it would not have been prudent, in a small open boat, to have continued my examination of the river up to the Siamese frontier town, which is said to be a place of some consequence, situated 30 or 40 miles up, nor could I have done so, in all probability, without incurring great risk of giving offence to the authorities by my intentions being misunderstood. I did hope to gain some satisfactory information from boats, but although we saw several, they viewed us with great suspicion, and evaded every attempt we made to communicate with them. Taking it for granted that this is the river forming the boundary between the British and Siamese territory, it is much further to the southward than the position generally assigned to it, and will account for the island and harbour of *St. Matthews* being considered as within our dominion.

The innumerable islands fronting this coast, and extending to the distance of 70 miles from it, exhibit a great variety of picturesque and wild scenery, the large ones rising in successive ranges of hills thickly wooded to their tops, with trees of a rich and varied foliage, present a most imposing and pleasing effect, whilst the small rocky ones, or birds' nest islands, with their rugged inaccessible sides, and irregular fantastic outlines, form a most remarkable yet not disagreeable contrast; the beauty of the whole being very much heightened during the rains by the numerous cascades and waterfalls that are interspersed amongst them.

Of the large islands forming a portion of the archipelago, those of St. Matthews and King's Island, situated near the two extremes, and remarkable for possessing excellent harbours, have been noticed by Captain Ross, and their locality is described by him: both these islands are mountainous, and of considerable elevation, being nearly 3000 feet high, but rising with a quick ascent from the sea, they present but little surface fit for cultivation.

Of the other large islands, those which have come more particularly within my observation, and which seem deserving of any notice, are *Sellore*, *Domel*, *Kesseraing*, and *Sullivans* Island, the *Lampee* of the Burmese.

The two first are much the same in general character and feature, as King's Island and St. Matthews, but not so elevated, and inside both of these islands there is good anchorage for vessels, the one under *Sellore* would be very convenient for communicating with *Mergui* from the southward, or with *Tenasserim* by the *Thuh-wa*. This I have taken the liberty of calling "*Auckland*" bay. *Sellore* is about fifteen miles long by two to four in breadth and extends from latitude 11° 52′ to 12° 7′ N.

Domel is situated more to the westward, between the parallels of 11° 25′ and 11° 50′ N. and is twenty-five miles long by four broad; and on the eastern side of three moderate-sized islands extending from the north end of it, there is another safe anchorage (*Morrison bay*) which might be resorted to if necessary, though not quite so convenient for communicating with *Mergui*. "*Kesseraing*" and "*Lampee*" both merit minute examination, which I was not enabled to give them. Off the latter, there is said to be a pearl bank, and the former is spoken of by the Burmese in high terms of praise, for the fertility of its soil: they have a tradition amongst them, of its having once been thickly populated, and it is said that there is still to be seen in the interior the ruins of an old town. I had no opportunity of ascertaining the truth of this, and although the face of the island does not corroborate the assertion, there appears so

far a probability of this island being superior to the others, that the general features of it although mountainous in parts, are more undulating and diversified in outline, and evidently present a greater proportion of moderately elevated and level land than the others. *Lampee* is eighteen miles long by seven or eight broad and extends from lat. 11° 31′ to 11° 49′ N., and inside of its south end is "*Whale Bay*" before spoken of; there is however no ingress or egress by the north end of the island, except to very small vessels, there being an extensive shallow flat between it and the main, caused by the meeting of the tides.

"*Lampee*" has also a very fine anchorage on its eastern side, so easy of access that the *Lady William Bentinck* surveying vessel succeeded in entering and obtaining shelter after dark, and there lay in perfect security during the continuance of some stormy weather which she was caught in amongst the outer Islands in the month of August. This island is of a curiously curved shape the pearl bank being situated somewhere on the south or concave side of it; the average breadth of the island is about two miles, the length thirty miles, and it is situated between the parallels of 10° 40′ and 11° 0′ N.: but the chart itself, will best exhibit the extent and limits of this and the other islands both in latitude and longitude.

With the exception of one or two settlements near to *Mergui*, where a few people have established themselves for the purpose of cultivating gardens, and rearing mangosteens, dorians and other fruits, and for fishing, there are no settled inhabitants on any of the islands; but there are roving tribes who pass from one island to another, living partly in their boats, and in temporary sheds, which they erect with a few sticks and leaves, on the little sandy beaches interspersed amongst the islands. They appear unacquainted with the art of cultivation, and subsist chiefly upon shellfish, turtle, and other productions indigenous to the islands, and the tortoise or rather "turtle shell," bich de mer, and other articles which they collect, they dispose of to the best advantage, and in barter, for a little rice and coarse cloth on their visits to *Mergui* and other places.

They are to be found chiefly amongst the outer islands during the fine season, and on the setting in of the rains and fine weather, they return to the inner ones, and for the right to frequent and live upon the islands, I believe they pay a small tax to government, of one rupee per head annually. The term *chillone* is generally applied to them, but I have understood that there are three or four divisions or families of them, known under different names, according to the part of the archipelago, they confine themselves to: they are a harmless race, badly

clothed, miserable in appearance, and do not, I imagine, amount to more than a thousand persons altogether: they are found to be extremely shy of strangers, and avoided us on all occasions.

Having been employed at a season unfavorable for making inquiry, or gaining much information, and with little leisure left me from the more immediate duties of the survey, for making any observations as to the resources of the islands, their formation, natural productions, &c. I can only point them out as appearing to possess a fine field for interesting inquiry in the different departments of science. To the geologist in particular there is ample scope for research, and I have reason to think, from specimens of rock that were collected containing rich iron ore, that they will be found to be rich in mineral productions.

The same may be said of their botanical productions; the face of the larger and moderately-sized islands, having a very rich and variegated foliage, and being covered with flowering shrubs and trees of large dimension to the water's edge, some of them may be found to be new and valuable.

In the department of natural history are to be found on the large islands (by native accounts), most of the wild animals common to the main land; viz. the tiger, elephant, rhinoceros, wild cow, deer, &c. The tiger is represented to be unusually large and fierce, when compared with those on the continent, and *Kesseraing* is said to be much infested by them. The "Shan" huntsmen visit this and the other large islands for the purpose of shooting elephants, which they are very expert in tracking; and they have been so successful in their excursions to *Kesseraing*, that I was told by a respectable native with great gravity, that there was now only one solitary elephant of gigantic size existing on the island, and of such consummate cunning that it had evaded every attempt to capture it.

Of the birds there are several varieties of pigeons peculiar to the islands; also gulls, cranes, ("Tucans" of a large and beautiful plumage,) and various other description of the feathered tribe.

Some of the small rocky islands are much resorted to by a small white gull. One of these islands I found covered with their eggs laid on the hollows of the rock, and the birds sitting upon them: they showed great alarm by their noise and hovering over head, and although I did not unnecessarily disturb them, I found (on a subsequent visit I had occasion to make, to correct a set of angles), that they had deserted the island and their eggs!

The fish are of great variety and very plentiful amongst the inner islands, and on the flats fronting the main, the fishermen have fish weirs

and other contrivances which they erect, and these they visit annually during the fine season, for the purpose of catching fish and drying them on the different small islands.

Beautiful varieties of mollusca and polypus also much abound amongst the outer islands.

Mergui, or properly speaking—"*Myut Myo*"—the principal town of the *Mergui* province, is too well known to require any notice from me; one of the objects of my survey, however, having been to ascertain the approach to it from the southward, I may as well state that it is inaccessible to large vessels, owing to an extensive flat, in many parts dry at low water, which the Chinese junks and other native craft have to cross over at high water. We found the greatest rise and fall of tide never to amount to so much as 18 feet, although it has been stated at 21 feet, and it is high water on full and change days here, and throughout the limits of the survey, between ten and eleven o'clock.

The climate at *Mergui* and amongst the islands seems to be very good, and although much rain fell on this coast during the months of June, July and August, there was a proportion of fine weather, (notwithstanding the generally received opinion to the contrary,) equal to what is experienced in India during the same season. The dorians and mangosteen fruits, held in so much estimation by the natives, particularly the former, which during the season are sent in great quantities to *Ava* for the use of the Burman king, do not grow to the northward of *Tavoy*; and the mangosteen will scarcely thrive to the northward of *Mergui*. Indeed in soil and climate, there appears to be so much affinity between it and *Penang*, where these fruits are in great perfection, and where nutmeg spices and coffee are produced, that it is very probable the latter might be introduced and cultivated with success at *Mergui*, and on many of the islands.

I regret that I have been able to give to this sketch little more than nautical or geographical interest; and in conclusion will merely point out what seems to me an object of interesting inquiry to geographers, I mean the exact delineation of the coast-line on the gulf of *Siam* side, between the parallels of 8° 0 and 12° 0 N. so as to exhibit the breadth of the isthmus within these limits, and also to ascertain how far the different streams on either side approach each other.

With intelligent officers from the Indian navy employed in the small government vessels on the *Tenasserim* Provinces, and in the steamer and other vessels under the *Penang* government, such a measure would have the double effect of protecting the trade and performing the usual duties expected of these vessels, and also of occasionally, when oppor-

tunities offered, adding to our stock of geographical knowledge. It would further possess the advantage of extending and keeping up a most desirable local knowledge, not without benefit to government, amongst the officers of a corps capable of rendering important service to the state, if its sphere of usefulness were extended for general employment in India instead of being confined to a subordinate presidency, which is like having the British navy under the Irish government.

IV.—*On the genus Hexaprotodon of* Dr. Falconer *and Captain* Cautley. *By* J. McClelland, *Assist. Surgeon, Bengal Service.*

Dr. MacLoed, physician general, on return to Calcutta from his tour of inspection, brought with him a small collection of the fossil bones of mammalia from the *Pinjore* valley, with the intention of forwarding them to England; prior to doing this they were obligingly submitted to my inspection, but for this circumstance and the desire of Dr. MacLoed that I should point out whatever might appear most deserving of notice, I should not offer, on this occasion at least, any remarks on a subject, of which there are already so many successful and experienced cultivators in India.

Hexaprotodon is the name given by Dr. Falconer and Captain Cautley to an unknown group nearly allied to the genus *Hippopotamus*, and with which we are only acquainted from the observations of those gentlemen on fragments of skeletons which they discovered in the *Siwalik* beds. Dr. MacLoed's collection contained a very characteristic fragment of one of these animals, which at once attracted my notice, and without being acquainted at that time with the excellent memoir of the gentlemen alluded to, though it is printed but not yet published in the 1st part, XIXth volume of the Asiatic Researches, I pursued an inquiry into the group as far as the materials in Dr. MacLoed's collection, as well as that of Col. Colvin in the Society's museum, enabled me to go. After this I had the gratification of finding the results to which I was led corresponded nearly, and I may say perfectly in all essential particulars, with the previous report of Dr. Falconer and Captain Cautley already alluded to. On some points however I feel justified in forming bolder conclusions especially regarding the affinities of the group, and the number of species that belonged to it. With regard to the first part of the subject it is necessary to refer to the *Hippopotamus*, one of those genera whose remains are extensively dispersed throughout the superficial strata of the earth, though the habitat of the only existing species

Fig 3

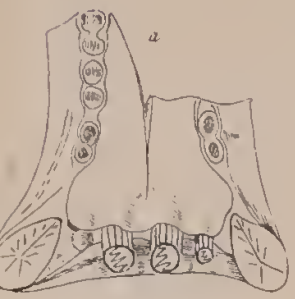

Fig. 2

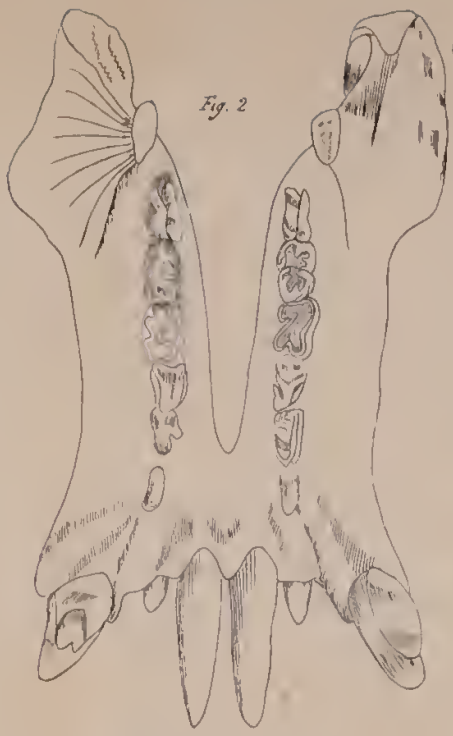

Fig. 1

Hippopotamus Lin.

Fig 4.

Fig 5

Fig 6

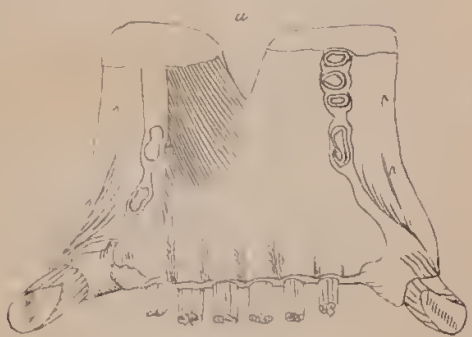

Fig 6 c.

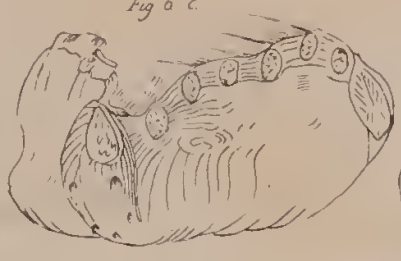

Fig 6 d.

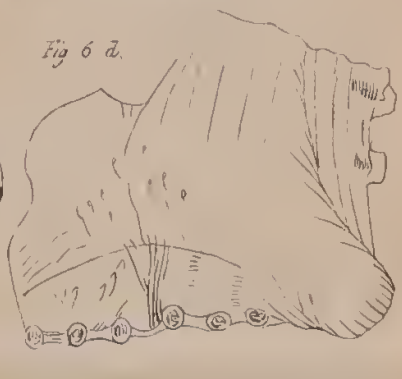

Fig 7

Hexaprotodon Falc. Caut.

is confined to South Africa, but the remains of others are found in Italy, France and England; so that its race may be said to have become almost extinct, and perhaps in the course of a few ages the existing species may like the *Dodo*, be numbered amongst those animals that have disappeared from the earth in modern times. Even since the time of the Greeks it appears to have become more restricted in its distribution, as it is referred to in their writings as an inhabitant of southern Egypt, where it is now unknown. The very idea of an animal of colossal bulk, capable of concealing itself by day beneath water which it quits only at night in search of pasture, is so contrary to the ordinary character of beings of the present world, and so opposite to the general economy of the living things that surround us, while it accords with the traces of the times that have passed, that we might infer from this circumstance alone, that the condition of the earth is now less suited to such gigantic amphibia than formerly, even if more direct evidence of this fact were wanting.

The remains of the Hexaprotodons brought to light by Dr. Falconer and Captain Cautley afford the characters of types still more aquatic, and which from certain peculiarities of structure would appear to have been hardly capable of extending further on land than the sandy or muddy confines of their own element. Before entering on the peculiarities from which this conclusion is derived, I shall briefly refer to what naturalists say of the habits of the existing hippopotamus.

The body is described as massive, without fur, the belly nearly touching he ground, and the head of enormous size, terminated by a strong thick muzzle, at the corners of which in the lower jaw two powerful canine teeth are placed, curved upwards with cutting edges often formed behind by the detrition of corresponding teeth in the upper jaw. Between these in front, there are four conical incisors in the lower jaw, extending obliquely upwards and forward; the two innermost of these are long and nearly as strong as the canine teeth, but the two outer incisors are shorter and every way less developed. The lower jaw is massive and strong, but much deeper under the molars than below the incisors at the chin, the whole economy of these parts being admirably adapted for cutting and tearing roots, and other fixed objects of a similar nature, on which it is said to subsist.

This description applies not only to the existing species, but also to the three fossil species discovered by Cuvier, who gives the characters of the genus as follows: "Incisors $\frac{4}{4}$, canines $\frac{1}{1}$. $\frac{1}{1}$., cheek teeth $\frac{7}{7}$. $\frac{7}{7}$. = 40;" but in the Hexaprotodons of Falconer and Cautley the incisors are six below, and six above, a distinction of itself perfectly sufficient to

establish the sub-genus as a new group, of which, they describe two species. In these animals the incisors are not only different in number from those of *Hippopotami*, but are also more uniformly developed, and are prolonged almost straight forward in the long axis of the head, the general proportions of which, though considerably less than those of the existing hippopotamus, are proportionably more massive and ponderous, while the incisors on the contrary are more slender, so much so as to preclude the supposition that they could have been used either for digging up roots, or as an armature in committing those violent depredations on dry land ascribed to the hippopotamus. It is therefore probable, as has been observed, that their habits were more aquatic. What proportion the head bore to the body we have as yet no means of knowing, the vertebræ and bones of the extremities not being yet determined, but we may still attain a farther insight into the characters of the Hexaprotodons by comparing such fragments of their jaws as have been found with the corresponding parts of the existing hippopotamus, and we find by this means that although the length of the jaws from the alveolus of the incisors to the last molar is, $9\frac{1}{2}$ inches in the latter, and from $11\frac{3}{4}$ to 13 inches in several specimens of the former, yet that the thickness or depth of the lower jaw at the symphysis is only four inches in the existing hippopotamus, while this measurement amounts to $5\frac{1}{2}$ inches in some of the hexaprotodons. In the first the breadth of the jaw at the narrowest part behind the canine teeth is five inches, and in one of the latter species, six; thus indicating a weight and massiveness in the head of the hexaprotodon which if attended with corresponding proportions in other parts of the frame must have belonged to an animal almost too unwieldy for locomotion on dry land, the hippopotamus itself from the shortness of its limbs being barely capable of such a mode of progression. The ponderous character of the jaws of the Hexaprotodons also implies a proportionably powerful muscular system; and when we contrast such a condition with the slender size of the incisors which are extended forward like a grate of comparatively long delicate bars, we can conceive no other object of such a structure than that of raking the *Fuci* and *Confervoid* plants either from the surface of water or from sands or soft muddy banks of rivers or lakes. Whether such will eventually prove to have been the case or not, will depend on the success that may attend the researches of zoologists in identifying other parts of the skeletons of this interesting group, in addition to those fragments that have already been identified by Dr. Falconer and Captain Cautley. At present we can only be guided by the facts that are laid before us, and perhaps

another argument may be adduced in support of the above view of the habits of these animals from the cheek teeth being extended at shorter and more regular intervals along the sides of the jaws to the canines, a structure which we may suppose to be more essential to the use of a soft food. As a share of Colonel COLVIN's extensive collections, comprising I believe many specimens of these animals, has been presented to the museum of the University of Edinburgh, we may expect the subject to receive the attention which it deserves, but at present we must I think, regard the type as more aquatic than that of the hippopotamus.

Dr. FALCONER and Captain CAUTLEY conceive that the genus *Hippopotamus* of LINNÆUS was confined to Africa and Europe, and that its place has been supplied in India by the Hexaprotodons : in this they are probably correct, but there is one specimen (fig. 3.) in Col. COLVIN's collection which though very imperfect appears to render the question at least somewhat doubtful ; the two inner incisors being indicated by the remains of their fangs, and a single small outer incisor occupying the centre of the space between the large incisor on the left, and the canine tooth, with a proper space on the opposite side, in which however, all trace of a corresponding tooth is obliterated. A careful examination of all the specimens in the museum, would also lead us to suppose that there must have existed in India more species of the new group than the two which Dr. FALCONER and Captain CAUTLEY have described, and I should be disposed to think the specimens alluded to tend to countenance the probability that four species existed, although our materials are hardly to be considered satisfactory on this point : from the importance of the subject it is desirable that the contents of every museum, so far as they are capable of bearing upon the question, should be known, so that the contents of one collection might illustrate those in another. I will therefore attempt to describe the separate specimens which I have examined. To show how far these fragments differ among themselves as well as from the corresponding parts of the existing hippopotamus (fig. 1.) and the principal species of the same fossil found in Tuscany (fig. 2.) the upper view of the lower jaws of those species are given for comparison.

Fig. 3. is the front portion of an imperfect lower jaw in Colonel COLVIN's collection ; it has one large incisor on either side of the mesial line, with a small one in the intermediate space on the left side as in the hippopotamus, so that a third could not have existed on that side ; but all trace of a corresponding incisor between the canine on the right side, and the inner incisor is obliterated, though the proper space for one remains. This appears to be the *H. dissimilis,* FALC. CAUT.

Fig. 4 is the corresponding part of a specimen in Mr. Daw's collection*. It is the *Hexaprotodon Sivalensis*, Falc. Caut., and appears to be the specimen figured by Durand, t. 4, f. 2.5, As. Res. vol. xix.

The breadth of the muzzle at the insertion of the incisors is ten inches, and of the jaw behind those teeth four inches, and the depth of jaw is five inches, and the length from the front to the last molar eleven inches. The four first cheek teeth are conical, single and prominent; the last molar is also composed of four prominent points but little worn, indicative of the youth of the individual, but still the other characters of the specimen are so well marked as to leave little doubt of its characterising a distinct species remarkable for the narrowness of the jaw behind the muzzle.

The incisors remain projecting nearly horizontally in front to the extent of two inches, where they were broken (As. Res. t. 4, f. 2) and may from this circumstance be presumed to have extended a considerable distance farther in front than represented. They are all of the same size, nearly cylindric, and about $\frac{3}{4}$ of an inch or rather less in diameter; the enamel of the canine teeth is striated as in the hippopotamus and the posterior edge worn by detrition.

Fig. 5 is the lower jaw of a specimen in Colonel Colvin's collection, it is more complete than any of the others, but on the left side the cheek teeth are removed to their sockets, as well as the canine teeth and incisors. The height of this jaw is barely five inches and the breadth of the muzzle ten and a half, the narrowest part of the jaw behind the canine teeth five and a half, and the length from the front of the jaw to the last molar is fourteen inches. The first cheek tooth alone seems to present a single crown, the three next are double, and as the teeth are perfect on the left side of an upper jaw in the same collection, which seems to have belonged to an aged individual of the same species, we can have no doubt as to the number of teeth proper to the group. In this species there are seven cheek teeth, the second and third placed in pairs. This appears to be the species indicated by Durand, As. Res. xix. p. 57, t. 4, f. 4.

Fig. 6 is the corresponding portion of the lower jaw of a specimen in Dr. MacLoed's collection; it differs from the preceding species in the breadth of the jaw which measures over the alveolus of the incisors eleven and a half inches, and at the narrowest part behind the canine teeth, six inches; except in breadth behind the incisors (fig. 4) corresponds nearly with this specimen, but the difference of breadth is so remarkable that we must, I think, regard the two as having belonged to separate species.

* The scale on which the figures are represented is one-fifth of natural size.

On the right side the anterior cheek tooth is broken in the socket, and the second tooth in the row presents two distinct crowns situated close together, but in the left side in this specimen as well as in a fragment of what is probably a corresponding species in the Asiatic Society, the second cheek tooth presents a single large compressed crown ; the three next teeth are placed close together, and are perfectly distinct from each other, but from the manner in which dentition appears to take place in these animals two points of the same tooth may be more or less distant from each other, so that a corresponding tooth in different individuals may occasionally appear double or single according to circumstances, but allowing the utmost latitude to variations of this kind, still we must regard the specimen in question from its breadth to characterise a distinct species ; more especially as we find the following fragment in the Asiatic Society's museum to corroborate all the essential peculiarities of this species.

Fig. 6 b. The fragment of a gigantic individual*, which presents a depth of six inches at the chin, with a breadth of more than twelve inches, and corresponds with Dr. MacLoed's specimen fig. 6, so forcibly as not to be mistaken in the most minute particular as having belonged to a larger individual of the same species ; the second and third cheek teeth in this are still remaining on the right side as well as the sockets and alveolus of the incisors and canines. The importance of this specimen (of which I have given two figures 6 b. and 6 c. the latter being the under side), consists in its suggesting that a difference in the same species gives rise in these, as in other animals, to no difference in form, and consequently that a difference of form in the fragments of several species is to be regarded as a specific distinction. Before I became acquainted with this fact, and compared the specimens to which I am indebted for a knowledge of it, I was disposed to think the following specimen probably belonged to a young *Hex. Sivalensis.*

Fig. 7 is the corresponding portion of the lower jaw of a small specimen only seven and a half inches across the muzzle, and three and a half inches in depth. The narrowest part of the jaw behind the

* On a shelf in the north-western corner of the museum, along with the cervical vertebræ, teeth, and other fragments of elephants and mastodons and numerous broken tusks of hippopotami without labels, or any indications of the place in which they were found, or who the donors were, so that we are left to infer that they came from the *Siwalik* beds, though in the same side of the apartment there are collections from *Ava* also without labels ; these have been destroyed by insects, which seem to have recently taken advantage of the neglected state of this department of our museum.

canine teeth is four inches in breadth, the whole being comparatively flat and broad: the reverse of what belongs to the species of which I supposed it might have been a young individual. The specimen is however too imperfect to show any peculiarities of dentition, the sockets of some of the teeth only remaining, and the left angle of the jaw being broken so as to give the muzzle an unequal appearance.

It is not consistent perhaps with the most approved method of studying nature, to lay very great stress on the peculiarities of any one organ in different animals; but it is rare that more than a fragment of some portion of the skeleton of fossil *vertebrata* is afforded for observation. The development of horns, and even of some parts of the frontal bone, as of the superciliary arches of the orbits, is liable to sexual and individual peculiarities*, but I am aware of no such objections to the fullest reliance on the lower jaw as a safe criterion for specific variations; for this purpose I have made considerable use of it in the arrangement of fishes, and there is no reason why it might not be equally useful as a criterion of species in other classes.

The two species described by Dr. Falconer and Captain Cautley differ essentially in this, that the jaw of *H. Sivalensis* is broad at the muzzle, and contracted more than the existing species over the penultimate false molar (Asiatic Researches, XIX. 47.) while that of *H. Dissimilis* is very narrow at the symphysis, where a greater number than four incisors does not appear to have existed. Hence fig. 4 in the annexed plate, and figs. 1, 2, plate IV. Asiatic Researches, XIX. represent *H. Sivalensis*, while the imperfect fragment in Colonel Colvin's collection fig. 3, in the annexed plate, is a characteristic fragment of *H. Dissimilis* of Falconer and Cautley.

But still we have fig. 4, pl. IV. (As. Res. XIX.) of Durand, which corresponds with a very perfect lower jaw in Colonel Colvin's collection, from which my fig. 5, on the annexed plate was taken, and regarding which Mr. Durand justly observes (Op. Cit. pp. 57): "It presents a marked difference in the shape of the incisors which are more elliptical than in the preceding varieties. The exterior incisors have a section not observable in any other specimen; and are relatively to the four centre incisors set lower than analogous incisors of other varieties—may not this" he continues "be considered a distinct species?" I am led to the conclusion after an examination of Colonel Colvin's specimens and all others in our museum that it is, and pro-

* In one of Major Hay's heads of the hippopotamus the arches of the orbits ascend two inches above the most prominent part of the intervening nasal process, and in the other only one inch.

pose to name it *Hex. anisiperus,* from *anisos* unequal and *peras* a line, refering to the irregular form of the incisors in this, compared with the other hexaprotodons.

I am also led to the conclusion as already stated, that Dr. MacLoed's specimen fig. 6 affords a third species agreeing with *H. Sivalensis* in having a broad muzzle and the incisors in a straight line, but differing from that species in the molar teeth being nearly parallel on either side of the jaw, or less contracted behind the canine teeth, and the general form of the jaw thicker and broader than any other member of the group, and hence it may be named *Hexap. megagnathus,* from *megas* large and *gnathos* the jaw.

In addition to these the small specimen fig. 7 must, I think, be regarded as afourth species, distinguished by its broad shallow muzzle, and though much contracted behind the incisors like *H. Sivalensis,* still differing from that species in the flattened form of the jaw, on which account it may be named *Hexap. platyrhynchus,* from *platus* flat, and *rhynchus* the snout.

In the only upper jaw of hexaprotodon in Colonel Colvin's collection in the Asiatic Society's museum; the cheek teeth on the left side are all nearly perfect, and so much worn as to indicate the advanced age of the individual to which it belonged. The incisors are removed but their sockets are as distinctly marked on both sides as could be wished. From the form of the muzzle it would appear that the upper incisors were directed more abruptly downwards than in the hippopotamus, they must consequently have been very short as their growth would necessarily be interrupted by the lower incisors; they are also of rather smaller diameter than the latter, but of equal size among themselves, and appear to have been intended for grasping such substances as were collected on the lower range of teeth, and with the assistance of the lips and tongue for drawing a soft aliment into the mouth, rather than for tearing like the hippopotamus. This jaw appears to have belonged to the same species as fig. 5, but to an individual a little larger.

It is unnecessary to say that the intermixture of terrestrial and aquatic forms entombed in the *Siwalik* hills, renders it impossible to derive any conclusion as to the habits of an animal towards land or water from its remains having been found in such a situation. The small collection of Dr. MacLoed comprises, in addition to the fragments of the jaws of a *Hexaprotodon,* the upper jaw of a *Palæotherium,* the frontal bone and horns of a Bos, various fragments of elephants and the scales or armour of a gigantic *Garial* nearly allied to *Lacerta gange-*

tica, Gm.* The scales of several crocodiles are marked on the back with a peculiar transverse ridge or carina which assumes a different form in the various species.

In the largest *Garial* in the Asiatic Society's collection these scales are three inches long and two broad, but the fossil scales are from five, to five and a half inches in length, and from three and a half to four in breadth, and one inch in thickness; taking into consideration the manner in which such scales are developed, the saurian to which the fossil scales belonged must have equalled if not exceeded the largest size to which *Garials* now attain.

The head of the *Palæotherium* in Dr. MacLoed's fossils, and the scales just noticed are enveloped in a calc tuff in a manner that deserves to be described. The first seems to have lain detached, resting on the palate and molars of the upper jaw, when calcareous water descended in drops gradually filling up the orbits and other depressions, thus converting the upper surface into an uniform hemispherical mass leaving the teeth and palate uncovered.

The scales of the *Garial* six in number are encased in the same manner, but what is still more interesting, they all preserve their true relative position and somewhat of the form of the reptile's back, as if they had been at once sealed together as soon as the animal had perished, and this I think we may prove to have been the case.

The lorications of these saurians are not imbricated like the scales of fishes, but are enclosed in a duplicature of the skin, and merely approximate without uniting in any way at their edges, so that the cutis is their only bond of union. Had this perishable substance given way long, before the deposit of calc tuff commenced, it is natural to conclude that such bony plates would from their form have been variously scattered around the vicinity in which the animal perished and lay exposed†. Hence we must infer that the drop commenced on the recent remains of the saurian, that it continued to operate until the upper surface of six of the scales was involved in one mass of carbonate of lime, and that this mass was found in the identical position in which the animal perished; that it was not transported from a distant locality we may further infer from the fact of some of the

* Captain Cautley has established the identity of this fossil crocodile with *C. biporcatus*, Cuv.

† Calc tuff is not deposited from water except under exposure to the atmosphere, so that it cannot take place in a close cavern or beneath the surface. Objects incrusted with it must therefore have lain exposed on the surface when the operation began.

ANCIENT PATERA found in Budukhshan by Dr LORD

comparatively slender scales remaining uninjured, though projecting from the edges of the mass beyond the enveloping deposit of carbonate of lime. Exact information of the circumstances under which fossils are found, though a subject of the highest importance, very rarely receives from collectors much attention, but as it is evident from these remarks that beneath the spot on which the scales of the *Garial* were sealed, that is, the spot on which they were found, its skeleton might be expected to lie, the locality may deserve further investigation.

V.—*Coins and relics from Bactria.*

It has been already announced in the pages of this Journal, that the extensive collections of coins and other relics made by Mr. Masson, by Sir Alexander Burnes, and Dr. Lord, were on their way to Calcutta, and were likely to fall shortly under the examination of the Editor. He felt it as a great compliment that was paid to his efforts to restore the lost portions of Indian and Bactrian history by means of the coins and inscriptions, still extant in the language and with the superscriptions and dates of the rájas of those times, that collectors in all parts of India were in the habit of submitting to his inspection whatever they lighted upon as unusual, and sought his reading and interpretation of the legends, emblems and inscriptions which baffled the learning and ingenuity of the pandits and antiquaries of the vicinity. As a consequence of the happy discoveries made by him in this line, coins and transcripts of inscriptions came in from all quarters, from *Assam* and *Ava* to *Bokhara* and *Sindh*, and from Ceylon northward to *Nipal*. The possession of the rich store of materials thus accumulated gave facilities of comparison and collation which were doubtless a main cause of his success: but the study and exertions required for the satisfaction of these numerous references to his individual skill, although entered upon with a zeal participated only by those who have achieved much, and feel that there is yet more within their reach which ought to be the result of their own discoveries, were too severe for the climate of India, and the Editor's robust constitution sunk at last under the incessant labour and close attention given to these favorite studies at the very moment when the richest collections of inscriptions, coins, and relics, that had ever been got together in India, were actually on their way to Calcutta as materials for maturing the results he had achieved. The collections of Mr. Masson were forwarded from Bombay in the *John Adam* which reached Calcutta only in the course of the past December. There are

of these coins from four to six thousand, besides the contents of several topes, and casts of figures of Budh, with various other remains of the period antecedent to the Muhammadan invasion of *Bactria* and *Afghanistan*. The whole of this collection was by order of government laid upon the table of the Asiatic Society at the meeting of January 1839, but the members present felt that in the absence of their late Secretary, and likewise of Captain Cunningham, Mr. V. Tregear, and Colonel Stacey, there were no persons in Calcutta to whom the examination, arrangement, and report upon the coins and relics could be committed with confidence. They came therefore to the unanimous resolution to recommend their being forwarded without delay to England, where the Honorable Court would have the opportunity of submitting them to the inspection of the late Secretary of the Asiatic Society, jointly with Dr. Wilson the librarian at the East India House, and so the ends of science and of antiquarian research would be most effectually answered.

The care of this magnificent collection, which is large enough to supply all the museums in Europe, has been kindly undertaken by Mr. Cracroft, a very zealous member of the Asiatic Society, and there is ground for hoping that under his superintendence a catalogue may yet be made before he takes his final departure for England. The articles have come round in bags without any separate lists, and in one bag there are about two thousand copper coins.

But independently of Mr. Masson's collection, another numbered by thousands has been brought to Calcutta by Dr. McLeod the Inspector General of hospitals to H. M.'s forces in India. This consists partly of coins of all metals, but there are also several seals and gems of different stones cut with a great variety of emblems and devices. All these are the property of Sir A. Burnes, and have arrived for deposit and custody as well as for inspection; they are therefore still available for the curious, and will continue so until Sir A. Burnes shall send instructions as to their disposal. We cannot ourselves undertake the particular examination of these relics so as to give the detailed description they deserve. A selection from the coins had however previously been made at *Simla*, and those deemed most curious being forwarded by the dawk arrived fortunately before the departure of our Editor. Amongst them is that most curious coin of Dr. Lord with the head of Eucratides on one side, and of both his parents on the other, a drawing of which was exhibited in plate No. XXVII. of this volume. From the other selected coins thus transmitted a plate was prepared by the Editor, which was intended to be illustrative of an article

he designed giving in our last October number. The plate remains, and we attach it to this article, that the curious who have followed our Editor to the length of his past researches may see the objects which he deemed worthy of fresh illustration in the field of Indo-Bactrian numismatology. If the *Herefordshire*, the ship in which he took passage, had touched at *Madras*, or had put into *Mauritius*, or had met a vessel at sea, we might have hoped for the comments promised on this, as on other two plates which we also intend to give and shall separately refer to. But the time approaches when the issue of the last number of our series will be expected, and we can no longer defer the publication, under the doubtful expectation of receiving the expected paper from the *Cape of Good Hope*. Of the coins and gems therefore in Sir ALEXANDER BURNES's collection we can at present make no use, but we hold them in deposit for the examination of others and to wait his further instructions. We must be content at present to give the plate referred to, which it will be seen is numbered XXXII. together with such brief reading of the names, as a Tyro of Indian numismatics might be expected with the aid of the alphabets to supply. The plate is of Indo-Bactrian coins of date antecedent to the introduction of Grecian art, with the Grecian alphabet, into the mints of that country. The legends are in the ancient No. 1. character of the then universal Páli language, with Bactrian characters in some instances on the obverse or intermixed. The names and emblems on these coins are well worth the study of the learned.

Along with Sir A. BURNES's coins Dr. MCLEOD brought to *Calcutta* a very singular relic obtained by Dr. LORD at *Badakhshán*, and which is we believe destined for the British museum. The relic in question is an ancient patera of silver, embossed in the interior in very high relief, and representing, with all the usual adjuncts of classic mythology, the procession of BACCHUS. The god himself sits in a car drawn by two harnessed females with a drinking cup in his hand. A fat infant SILENUS stands in front, and there is a female figure kneeling on the after corner of the car, which from its disproportionate size we imagine to be the carved elbow of the seat on which the god reclines. There are also two winged cupids in attendance, one flying with a wand in his hand to which a fellet is attached, the other end of which is held by the infant SILENUS; and the other on the foreground behind the wheel of the car, as if employed in pushing it on. The car is followed by a dancing HERCULES distinguishable by the club and lion skin. The heads of this figure and of the BACCHUS are both wanting, owing probably to their having been of gold or thought so, while the rest of the patera

being only of silver gilt, has escaped similar violation. The gilding however is mostly worn away from long use, and in one part the side of the cup is actually worn through. Independently of the circumstance of the main figure being represented with a cup in hand, its identity with the Grecian Bacchus, is proved by the vines circumpendent, and by the figure of a tiger standing prominently out in the fore ground and drinking out of a wine jar.

This very singular relic being destined to leave the country, we have thought it necessary, besides giving in these pages a plate made from an accurate drawing with a scale, to have a cast prepared from it in tin, so that in case the original should be lost in transmission to Europe, the facsimile may remain to give a complete idea of its form and execution. The cast is of course not equally sharp in its lines with the chased original, but connoisseurs will know how to make exact allowance for that difference.

This patera is the property of Dr. Lord, who is also the fortunate owner of the double-headed coin of Eucratides, the original apparently from which the plate of a similar coin is given in Dr. Vincent's Periplus; but the double head is there represented as being on both sides of the coin. With a liberality deserving of particular notice, both these unique relics have been gratuitously appropriated by the finder, or are intended to be so, in the manner deemed by him most conducive to the ends of science, Dr. Lord not desiring to retain them as isolated trophies of his own good fortune in the field of research and discovery.

I fear we must not look upon this piece of plate as affording evidence of the state of the arts in *Badakhshán*, where it was found, at any particular æra. That it is of high antiquity is quite apparent from the condition of the metal, as well as from the design, but in the Periplus of the *Erythrean Sea* published amongst Arian's works, it is distinctly stated that ἀργυρώματα, *i. e.* articles of silver plate, were a staple import from the west, for exchange against the productions of India. At *Minnagarh* upon the Indus, it is further stated by the author of that treatise, that he himself presented to the rája βαρύτιμα ἀργυρώματα, valuable pieces of plate, in order to secure his favor, and the grant of certain privileges of trade. There is thus reason to believe that the patera must have been brought from Greece or Asia Minor, and either presented in like manner, or sold to some sovereign of *Bactria*, by a merchant desiring similar privileges of trade in that country. That it has been in use for centuries is evident from the worn condition it now presents; but for how many it was in use, and for how many it lay treasured in royal or other repositories, is more than may now be conjectured.

Indo-Bactrian Coins

Buddhist Satrap Coins.

Prinsep sc.

A drawing of this patera was made at *Simla* by no common hand several months ago, and it arrived and was exhibited at the Meeting of the Asiatic Society, but somehow disappeared, so as to preclude an earlier description of this relic being laid before the public. We have now the original before us, and have examined it closely, to see if there were any inscription, stamp or emblem, which might afford some clue to the date and locality of the manufacture, but are compelled to be content with a mere description of its outward appearance, being unable to hazard a conjecture as to either.

Indo-Bactrian Coins.

Specification of coins in Plate XXXII. Vol. VII.

No. 1. Obv. Armed figure standing with a club or spear: no inscription. Rev. Elephant with rider: Bactrian inscription RAJASA, rest not decypherable.

No. 2. Obv. Woman and deer, with inscription not legible: ⌂ emblem. Rev. Tree and mountain, with ⚓, and ⧖ emblems.

No. 3. Obv. Man and bull, same emblem as No. 2, and MAHÁRÁJASA MAHABHATASA in old Páli clearly legible, but the name to the left baffles us. Rev. Same device and emblems as No. 2, and MAHÁRÁJASA clearly legible in Bactrian at the bottom.

No. 4. Obv. Same device as No. 2, and same emblem, RAJNA RAJASA MAGHADATASA in old Páli. Rev. Same device and emblems as No. 2, MAHARAJASA in Bactrian: the rest not legible.

No. 5. A larger coin, the same device on both sides as No. 3; Obverse defaced; Rev. MAHARAJASA in Bactrian characters.

No. 6. Obv. Bull and ⚹ emblem, no letters. Rev. Same emblems as Nos. 2, 3, and 4, with addition of a wheel: very peculiar.

No. 7. Obv. Deer and man, with emblems ⧖ and ⌂: RAJNA KUNANDASA in old Páli. Rev. Same as Nos. 2, 3, 4, &c.

No. 8. Obv. Deer and woman: MAHARAJASA in Páli. Rev. Same as No. 2, no inscription.

No. 9. Obv. Deer and man, KUNANDASYA in Páli. Rev. Same as No. 2.

No. 10. Same precisely, Páli inscription NANDASÁ the last letter being an initial A′ ᛋ.

Buddhist Satrap Coins.

No. 11. Obv. Horse caparisoned. Rev. RAJASA, in Bactrian, with various marks.

No. 12. Obv. Horse. Rev. Standing figure with bow: inscription in Páli, SARBA TÁPASA PATAMAPASA, Thamasp?

No. 13. The same indistinct.

No. 14. Obverse the same worn. Rev. Inscription in lines, Tamapasa legible in Páli.

No. 15. Nothing distinct.

No. 16. Obv. Horse's tail and hind quarter. Rev. Figure standing Laga'mapasa in Páli.

Nos. 17, 18, 19. Obv. Bull. Rev. Standing figure with inscription Rajnapadasa : centre one in Bactrian.

No. 20. Obv. Standing figure, Páli inscription, Paghugapasa. Rev. Figure : no inscription.

No. 21. Nothing made out.

No. 22. Obv. Figure in speaking attitude. Rajna Raghuna'm.

Nos. 23, 24, and 25, not decyphered.

N. B. These latter are classified as of the Satrap group, first because of the title Rája or Mahárája not being found in any of them ; secondly, because of the names having so evidently an ancient Persian aspect, and lastly, because of the horse emblem, which probably had its origin in the circumstances which attended the accession of Gushtasp, Darius Hystaspes.

VI.—*Ancient Hindu Coins from Jyonpur and Oojein.*

Besides the coins of *Bactria* and *Kábul*, which formed the subject of the preceding article, and which carry back the numismatic records of that country to times anterior to the *Grecian* invasion, when it formed a province of the dominions of the great king of *Persia*, and even before that, when governed by its own, or by an Indian mahárája, there have been found simultaneously in distant parts of India, other similar records of the same periods. Mr. Vincent Tregear has been so fortunate as to obtain, in the vicinity of *Jyonpur*, several coins of the early period of the Devas and Dattas, with legends, plainly legible, in the oldest form of *Páli* character, and likewise more than one Purusha Datta, which it requires no great stretch of credulity to identify as the coin of the great Porus himself, the antagonist of Alexander. These coins were transmitted to our Editor for more complete illustration, with a brief notice by Mr. Tregear, whose readings have much aided us in framing the annexed descriptive list. From the number thus transmitted a selection was made for the annexed plate, which was not ready when our Editor left Calcutta. We think it due however to our readers to insert the plate in the last number of this series of his journal, for the same reason, that we in the preceding

Ancient Hindoo Coins.

article gave the plate of Indo-Bactrian coins, and with the same imperfect notice of the legends and emblems.

Ancient Hindu Coins, Square. Plate, No. LX.

No. 1. Copper coin, Obv. Bull and mountain with double cross, as in Indo-Bactrian coins, but with one tier less, thus instead of , at top plainly legible in ancient Páli DHANADE'VASA. Rev. Warrior figure standing in centre: no inscription.

No. 2. Obv. Same bull device and inscription, but instead of the two-tier mountain an emblem thus , quasi, garden and tree. Rev. Same as No. 1.

No 3. Obv. Sitting elephant, trunk curled inward, inscription according to TREGEAR, also DHUNADEVASA, but we read CHATUDEVASA or CHATRADEVASA. Rev. Indistinct.

No. 4. Copper. Obv. Bull turned leftward; inscription in ancient Páli VA'SUDEVASA. Rev. Curious circular device, snake at bottom, tree and garden to right, and left : no inscription.

No. 5. Copper. Obv. Device, perhaps a fire-altar, but very peculiar. Inscription in Páli DHANADE'VASA. Rev. Peculiar, indescribable.

No. 6. Copper. Obv. Elephant passing to left. Inscription Páli, as in No. 3. Rev. Sitting figure in circle : no inscription traceable.

No. 7. Copper. Obv. Bull passing leftward: no inscription. Rev. A circle, somewhat similar to No. 5 : nothing clear.

No. 9. Copper, broken. Obv. Device not distinguishable ; inscription, first letter effaced, *Danasa* the concluding letters clear. Rev. Tree and garden with .

No. 10. Inscription of a coin clearly legible PA'PAPAGHO.

No. 11. Ditto apparently KANEVA'SA

No. 12. Ditto Raja DHANADE'VASA.

Nos. 13 and 14. End of inscription, NAVASA.

Hindu Round Coins.

No. 8. Bull looking to right. Rev. Large letters at bottom NE'VASA ; emblems indistinct.

No. 15. Obv. PURUSHA DATASA in old Páli, round a standing figure, with double *trisula* or trident to the right.

No. 16. Female figure, with four Páli letters, , not quite legible ; emblems and with .

No. 17. Flower with old Páli letters not distinguishable.

No. 18. Standing figure with double trisul, or tree, to left, Páli inscription round, not legible.

No. 19. Standing figure, without inscription or emblem distinguishable.

No. 20. Obv. Standing figure, tree to right: Rajna Ram Datasa in Páli. Rev. Tree only distinguishable.

No. 21. Standing figure; inscription large in Páli characters, Rája Rama Datasa.

No. 22. Standing figure, Rama Datasa plainly legible: star, snake, and other emblems.

No. 23. Standing figure, with bull, trisul, and star, Raja Rama Datasa plainly legible.

No. 24. Obv. Standing figure: bull and trisul, Raja Rama Datasa. Rev. Trisul and other emblems.

No. 25. Standing figure, Rahu Rajasa.

No. 26. Standing figure, bull and snake: nothing legible.

No. 27. Broken, square, sitting bull: Vasatu Datasa.

No. 28. Obv. Bull passing to left: Suva Datasa. Rev. Not distinguishable.

Nos. 29 and 30. Not clearly distinguishable, but of similar type to No. 25. Inscription in No. 30, Rahu Rajasa.

Plate No. LXI. is of coins which were dug up in *Oojein*, and forwarded by Mr. Bax to Major Ousely of *Sagur*, by whom they were sent to our Editor. Some of the same type and appearance in every respect were about the same time obtained by Dr. Burns at *Kaira*, and will be found represented in the same plate. There is no inscription of any kind on any of these coins, excepting on No. 2 and No. 22, on which the word *Ujayina* is plainly legible in well formed letters of the oldest Páli character. All of them present the appearance of greater antiquity than can be claimed by any other coins, which have hitherto been described. The four rings ⚶ a tree and garden, and mountain seem to be the distinguishing emblems, but as no description can equal the representation given in the plate, we deem it quite unnecessary to explain their appearauce separately.

The coins from which the above plates have been prepared are still in deposit with us, and we wish it to be understood that we hold them at the disposal of the owners, who have only to indicate the manner in which they desire to have them returned, and we shall make a point of following their instructions in this respect.

ANCIENT COINS FROM OUJEIN

Kamath Sculps

VII.—*Ancient Inscriptions.*

We have very little room in this number for the further prosecution of the intention declared, of exhibiting in the pages of the Journal transcripts of all the numerous inscriptions, of which copies and facsimiles have been transmitted to us. But that we may not fail altogether to redeem the pledge thus given, we have selected some short ones.

I. Captain J. S. BURT of Engineers, now stationed at *Gházipur*, has been so fortunate as to discover a fallen pillar at *Palladpur* on the banks of the Ganges in the *Zaminea* perguna, round the centre of which is a short inscription in the No. 2 character. The shaft lies on the ground, more than half buried, about six kos south of *Gházipur*. It is described by Captain BURT as a perfect cylinder of three feet diameter, polished and rounded for a length of twenty-seven feet, and with a rough base of nine feet, the whole length being thirty-six feet. Round the centre is an inscription of a single perfect sloka, to read which completely Captain B. was compelled to cause a trench to be dug underneath the shaft of the column. The sloka as read and explained by KAMALÁKÁNTA is as follows:

इह विपुल विजय कीर्त्ति : क्षत्रस द्धर्म्म पालः सततदयित पार्थः पार्थि-वानेकपालः विश्रदित पितृपक्षात्ते मसन्दोहपालः विहित इव विधात्रापंचमो लोकपालः।

"Great, victorious, of high renown, the promoter of the virtue of Kshatris, always like the sons of KUNTI (YUDISHTHIRA, &c.), protector of many kings, for the honoring of his father's memory practising many virtues, in his actions and conduct truly a fifth LÔKPAL divinity."

From the manner in which the sloka ends with "LÔKPAL," it is surmised that that must be the name of the sovereign in whose honor the inscription was written, but there is no date or other means of identifying it. The pillar is well worthy of the examination of the curious.

II. In closing this series of the journal, our acknowledgments are due to the more than common zeal, with which Captain BURT has collected, and the care with which he has made the facsimiles of a great variety of inscriptions. One valuable one containing the names of several new rájas was obtained by him from the vicinity of *Chatarpur* in *Bandelkhand*, and we hoped to have been able, with the assistance of the Rev. Mr. MALAN, to have given its translation in the past month; but the failure of that gentleman's eyes has compelled its transfer to other hands, and it remains to enrich the new series of the journal.

III. Another facsimile taken by Captain Burt from a temple at *Oodeypur* in February 1838, deserves also particular mention, not for its substance, which is merely a grant of no great antiquity by a rája named Punya Pal of *Jogobatee*, but because the date is given in three eras, one of which is new. It shows the Sumbut year of Vikramaditya 1116, corresponding with 981 of Salivahana, to have fallen in the year 446 of Oodyaditya, therefore the rája Oodyaditya, from whom probably *Oodypur* derives its name, lived in the year 670 of Vikramaditya or about 614 A. D. This rája's name is not in the chronological tables of the Sesodee, or of any other dynasty. But the name of Deva Ditya occurs, at about the period assigned for the æra in this inscription, and they may be identical.

IV. The next inscription of which we shall furnish a translation, is one often mentioned in the pages of this journal, viz. that of *Bageshar* near *Almora* in the province of *Kamaon*. This inscription was copied by Mr. Trail the late commissioner, but the copies proving defective, facsimiles were also obtained, from which the following transcript and translation have been made.

There are still several hiatuses, and especially towards the close, where the date will most probably have been. Failing this means of fixing the period when the rájas named in this inscription lived, we have nothing but the appearance of the stone, and the character of the writing to indicate its probable epoch. In the present instance these are uncertain criteria, for the character, though ancient and in some respects peculiar, does not correspond sufficiently with that of other inscriptions or coins to afford a safe chronological guide. The inscription so far as it has been decyphered is as follows :—

१ ॥ स्वस्ति ॥ श्रीमति देदीप्ते देवद्वारदक्षिणे एतंवागेश्वरं तिर्थमही
पाठकगणेन ॥ एकपनगरपवुपिदातसुरकरिणि निनूलनाविनतनमद्वास्यं
श्र म्र
प्रणतपरदेवचरणं पशुपासनासनंदेवं परमभट्टारकमहाराजाधिराज
परमेश्वरश्रीभसन्तनदेवः तत्पदानुध्यानरतराज्ञी महादेवी श्रीसाज्यन
रानिभा तस्यामुत्पन्नः परममहेश्वरः परमप्रत्ययः परमभट्टारकमहारा-
जाधिराजः परमम्बरेशाय खैरं खैरं ददौ कुशली जयकुलभुक्तिप्रतिपद
व्यां प्रतोलिकात्वासीत्तथाम्बीरपलिकायां श्रीव्याघ्रेश्वरदेवाय गन्धपुष्पस्तु
धूपदीपसमालेपनखंडस्फुटितं समरावनाय प्रतिपादितम् सुकीर्त्तिप्रचयं

तु चन्द्रार्कयाज्ञौदीच्यं आसन्विष्णुधर्म्मणां विषये ते ते ये उपरिलिखित देवाय गन्धपुष्पादिकाः यस्यभर्त्राप्रतिबद्धाउपरिलिखितस्य च स्वर्णेश्वर ग्रामः तथाच प्रतोलिकासद्मप्रतिपादितं परमभट्टारकसहाराजाधि-राजपरमेश्वरश्रीखर्परदेवः तस्य पुत्रः तत्पादानुध्यानरतराज्ञी महा-देवी श्रीकल्याणदेवी तस्यामुत्पन्नः परममहेश्वरपरमबहुवरेण्यः परम भट्टारकमहाराजाधिराजपरमेश्वरश्रीकल्याणराजदेवः तस्य पुत्रः तत्प-दानुध्यानरतराज्ञी महादेवी लद्धादेवी तस्यामुत्पन्नः परममहेश्वर परमवरेण्यः परमभट्टारकमहाराजाधिराजपरमेश्वरश्रीत्रिभुवनराज-देवः कुशली जयकलभुक्तिकायां नायक्षेत्रं प्रतिवद्धं विचार्य्यद्रोणद्वयसार्द्ध

इहैव भूम्यामुपरिलिखितदेवाय गंधपुष्पदीपादिका ये ये ते ते प्रतिपादिता इति आसीत् किरातोतः तस्य पुत्रेण शाकं वद्धसंवन्धः इहात्र प्रतिपत्तव्यं देवतोद्देशेन गावियपिंलपयरातदोखरियं प्रतिवद्धः द्रोणसार्द्धद्वयभूम्या मूर्द्धं उपरिलिखितदेवस्य च प्रतिपादितं अपरोप्या घिध्वजपुत्रः पुनः रोण वहुरणेकप्रतिवद्धं भूमिद्रोणैकं सार्द्धं तत्र तत् तत् ॥ विघादूइप्रस्थ संवद्धबप्र ११ तथावक्रेश्वरप्रतिः वद्धभूमिद्रोणैकं ववृचामुण्डादेवी पूर्वतः भूमीप्रस्तचतुर्द्दशः

१४ तान्येव भूम्याणि? उपरिलिखितश्रीव्याघ्रेश्वरदेवाय उपभरण तिमितिराश्रीमल्लन्ति वत्सरात् सकलामर दितितनुजमनुजावद्धभक्तिभावभरादरोन्नमितोत्तमाङ्गः शशिनिकट मुकुटकिरीटनिवद्धकोटिकोटिशोभैकायनगङ्गोदकप्रदीपदीप्तदीधितिपा तमहारत्नकमलामलविपुलवहुलकिरणकेशरासारसारिताशेषविशेष मोषिघनतमभोगिगणविद्योतजटाजुटस्य कुशलतनोधूर्जटेः प्रसादात् निजभुजोपार्जितउर्जित्यः निर्जितरिपुकलधौतौघप्रकाशः दयादाक्षिण्य

श

सत्यसत्त्वशीलसौर्य्योदार्य्यगांभीर्य्यमर्य्यादाचरित्राश्चर्यकार्य्यन यादिगुणग णाद्यलंकृतशरीरः कृतायुधातिसत्वेन विजयचतुरः कृताध्वरप्रगीत कीर्त्तिश्रीनंदनामरावतीपतिचरणकमलकमलासेवार्थमूर्त्तिः श्रीनिम्बरत देवः तस्य पुत्रः तत्पादानुध्यानरतराज्ञींमहादेवी श्रीदासुदेवी तस्या

मुत्पन्नः परममहेश्वरपरमवरेण्यः परमभट्टारकमहाराजाधिराज पर
दि
मेश्वर श्रीमदीश्वरदेवः तस्य पुत्रः तत्पदानुगतराज्ञी धरादेवी तस्या
मुत्पन्नः परममहेश्वरपरमवरेण्यपरमभट्टारकमहाराजाधिराजपरम
शूरश्रीमल्लितशूरदेवः तस्य पुत्रः तत् पदानुध्यातराज्ञी महादेवी
श्रीसायदेवी तस्यामुत्पन्नमहेश्वरपरमब्रह्मण्यपरायणपरमवृद्धश्रवणरिपुनी
लनलिनदरतरललामसुचकितविलोचनसत्यासन्नश्रमितलावण्यरमणी
योपायनकिसलयदलायमानप्रणतसमस्तभूपतिमुकुटमणिनिनादितविनि
र्गततिमिरमहास्त्रमहासुवर्णचरणतलः कलेरप्यायनप्रकटः पोद्भूताय
प्रतिपादितश्रीपरमभट्टारकमहाराजाधिराजपरमेश्वरोपमीयाच्छ्रीभू
देवदेवः जयकलदुर्गपश्चिमतः ग्रासितग्रामः परमप्रश्रवणसभा तथा
भुरत्ययनी १ तथासिवालिका पल्लिका तथाप्रतिवद्धाः
स्यादरसमीजय श्रीव्याघ्रेश्वरदेवाय रानूपुषप्रद भरतस ॥

Translation by Sárodá Prashád.

Blessing and salutation.—On the southern part of this beautiful temple, the royal lineage is inscribed by learned persons.

Bow down at the foot of Paradeva (the great god) placed at the gate called *Nínúnanuti* at *Pavupidadata* in the village of *Ráruya;* which (foot) destroys the nets of animals.

There was a rája named Masantana Deva who was a king of kings, most venerable and wealthy. In his wife, the queen named Sajyanaráneviá, who knew no one but her husband, was conceived a rája who was also a king of kings, the richest, the most respected of his time, worthy to be trusted and prosperous; who set apart successively provisions for the worship of Parameswara (or the supreme Lord), and caused several public roads to be constructed leading to *Jayakúlabhúkti*, and who provided fragrant substances, flowers, incense, lamps, and oiutments for Baghreswara Deva (or the god of tigers), in *Ambilapalika* (perhaps a forest) and who was the protector in battle: who moreover gave fragrant substances, flowers, &c., and the village named *Sarneswara Gráma* which his father had granted to the Vaishnavas (or the followers of Vishnu') for worship of the above mentioned god. Who erected buildings on the side of the public roads.

As long as the sun and moon endure so long shall these his virtuous deeds exist.

His son was KHARPARA DEVA the king of kings, respectable and wealthy; in his wife ———— who was much devoted to him was born ADHIDHAJA; who was most wealthy, honorable and learned. Of his queen LADHDHA DEVI' who loved her husband dearly, was born TRI'BHU'VANA rája DEVA who was active, rich, honorable and intelligent. He *(Tríbhúvana rája)* gave two *dronas* of a fruitful field named *Náya* in the village of *Joyakulabhúktika* to the above god, and also ordered the fragrant substances, &c. produced in it, to be employed in the worship of the same god.

It is also worthy to be known, that he was an intimate friend of the son of KÍRATA, (perhaps a hunter,) who gave two and a half *dronas* land to the above mentioned god and to the god GAMBIYAPINDA.

Another son of A'DHIDHAJA gave one *drona* of land to the god BAHÁRAKE, and moreover caused a grant *(Sásanan)* of two bígas of lands to be engraved on a stone in the Samvat year 11. He also gave one *drona* of land to the god BAGHRESWARA and fourteen parcels of land to CHANDALNU'NDA DEVÍ and he established a *Prapa*, (*i. e.* trough or place where water is distributed,) in honor of the former.

All these tracts of land have been consecrated to the god BAGHRESWARA for his worship.

There was another rája named NUNVARATA who was possessed of compassion, sincerity, truth, strength, good dispositions, heroism, magnanimity, intellect, politeness, and good character, of a charming person, adorned with morals and with several eminent qualities, active in conquering by the force of his bow held in hand, and born for worshipping the lily feet of the owner of *Nandana* and *Amarávatí*, *i. e.* INDRA, who acquired fame by the force of his arms, through the favour of DURJADHI (or SIVA) who wears *Jotájuto* (or matted hairs), on his head, tied with the pearls of his crown resembling a crescent, and illuminated with the purest water of *Ganga*, which confers ten million beauties, which *Jotájuto*, or head of hair, robs other radiant substances of their lustre by its many large, clear, and beautiful jewels, and bright kesara flowers on which play the black snakes. He (the rája) subdued all his enemies, and his colour was like gold, his fair body was always bent down with respect for the worship of all gods, daityas, men, and learned persons, and his fame is sung every where, as derived from the performance of Yagyas.

His son ISTOVANA DEVA, born from the chief of his queens DASU' DEVÍ who loved him dearly, was a king of kings, rich, respectable and learned. His son LALITA SU'RA DEVA was born of his wife DHARÁ DEVÍ, who was much devoted to him, who was also

a king of kings, wealthy, respected, intelligent, and in all respects a hero. His son Bhudeva Deva was born of his wife Láya Devi who loved much her husband. He also was king of kings, a zealous worshipper of Brahma, an enemy of Budha Sravana, a lover of truth, rich, beautiful, learned, continually engaged in religious observances, and a person near whom Kalí (the yuga) could not approach ; whose eyes were beautiful as blue lilies and quick, the palm of whose hands resembled young twigs, whose ears were frequently troubled by the sound of the jewels of the crowns of rájas who bowed before him, and whose great weapon destroyed darkness, whose feet resembled the colour of gold, who granted pensions to his favorite attendants.

He———the remainder defective.

N. B.—This inscription is supposed to be about 1500 years old, but, as before stated, the date is conjectural. There are faults of grammar in the Sanskrit, for which the Pandit who drafted the inscription is answerable.

VIII.—Mr. Kittoe's *tour in Orissa, continued from page* 829 *of September*, 1838.

On the following morning (the 16th March), I proceeded to *Atturva* a large village on the banks of the Brahminee river, the greater part of the way was through very dense jungle, with some small patches of cultivation interspersed ; I met with only one village in which there were many large herds of buffaloes, and other cattle ; cultivation is also extensive. I here observed a method of tilling the land quite novel to me ; the fields are dug with long and heavy crowbars, each clod as it is turned up, is bruised with the bar, and thus prepared for the seed without using a plough ; indeed the stiff nature of the soil, would not admit of its being ploughed in the dry seasons. This practice I found to prevail throughout the valley of the Brahminee, which tract is very fertile.

The distance travelled this morning must have been nearly fifteen miles. Nothing new presented itself at *Atturva*, where the bed of the river is about half a mile wide, the water at this season occupying but an eighth of that space : being very shallow it is only navigable for small canoes.

17th March, Camp *Nadurra*. This is a large village on the banks of the river about thirteen miles from the last camp ; it may however be much less in a direct line : my guides purposely took me by a very difficult and circuitous route, inland from the river along the banks of which I ought to have travelled ; such is the wiliness of the Ooreyahs,

their object being to decoy me from the site of the rich lands which I should otherwise have seen ; my companion Mr. B. came by the latter route, while I was completely at the mercy of my guides, having a palkee for my only conveyance. I however walked the greater part of the way, and passed several villages, all of which appeared to possess much cattle ; the pasture land is very rich.

The chain of low and isolated hills to my left (south) came here nearer to the river ; the ground undulated considerably, and in many places I met with extensive beds of shingle containing the debris of rocks, common in the more elevated mountain chains of *Hingool*, *Talcher* and *Rehrakhol*, with which is mixed much jasper, laterite and iron stone conglomerate.

A great variety of small fish were brought, among which I observed some species quite new to me, of a couple of which I took drawings.

In the evening I was visited by an intelligent ascetic, from whom I learned much concerning the coal beds in *Talcher* and its vicinity, particularly one called *Hingolai Thakooranee ;* indeed I am entirely indebted to this individual for its discovery, no pains being spared to mislead and deter me from going beyond *Talcher*.

On the 18th I continued my march, and was again led by a roundabout path to a small hamlet on the river side called *Kumlung*, a short distance beyond the village of *Mungulpur :* it is on the boundary line between *Talcher* and *Dekennàl.*

The bed of the river here is about a furlong and a half wide, the water flows under the opposite bank where there are granite rocks ; it is still, and very deep ; I found a great abundance of coal scattered over the sand, which removed the doubts I had hitherto entertained of its existence in this neighbourhood.

I was informed that the navigation of the river from *Talcher* to as far as *Kurgparsad* is considered dangerous for large boats, which are consequently not brought higher up than that place, where the first rocks occur ; therefore should the coal fields ever be worked, it will be necessary to remove these rocks, which might be done without much labor or expense, there being few that I should consider really dangerous.

19th, Camp *Talcher*, *Patna*. Marched this morning at an early hour ; the distance was about five miles over an undulating country with little jungle but much high grass. There were few villages and the cultivation very limited. The soil appears remarkably poor with much gravel mixed with it ; the sandstone rock predominates : there are however some huge masses of granite protruding through the soil, having a very curious appearance.

I encamped on the banks of the river, about half a mile east of the town and *Gurh;* the latter is on a sandstone rock washed by the river, the former is contiguous to it on the south side, extending for half a mile or more. The *Gurh* is a stockade surrounded on three sides by a deep ditch; within is a long street reaching from the southern wicket to the chief entrance of the rája's residence, the principal buildings of which are of masonry. All the smaller out-houses, had been burned to the ground, together with the granaries a few days previous to my arrival.

The rája with his sons paid me a visit in the afternoon. I was very agreeably surprised to find him a shrewd intelligent old man. He has travelled over the greatest part of India, having performed pilgrimages to *Ramesseram* near *Ceylon*, and to *Budrinath* in the *Hymalayas*. He promised every assistance towards furthering the discovery of coal fields. On his taking leave I presented him with a musical box with which he was much delighted.

In the evening I returned the rája's visit; he shewed me his *Gurh* which is in a very dilapidated state, as an excuse for which he said that there was no occasion for strongholds, while he lived under British protection. He dwelt much on his poverty. After taking leave of him, his sons accompanied me to a nullah about half a mile to the westward, and called *Billaijooree*, in the banks of which at about 400 yards from the river, seams of coal are apparent; they appear to abut on the sandstone rock, and are a very few feet below the undulating surface, which is alternately clay and shingle. The seams vary in quality and thickness, and are curved nearly parallel with the undulations of the superstrata. I attempted to sink a shaft, but was prevented by coming upon a hard rock of a bluish color containing mica, coal and fossil plants. I blasted the rock, which proved twelve and a half feet thick, beneath it was a stiff grey clay containing coarse sand and mica.

The following day I again visited the coal beds, and lighted a large fire, to the amusement of the natives who had never seen stones ignited.

The next morning I proceeded to the village of *Mungulprasád* about fifteen miles west of *Talcher*, under which is a dry torrent called the *Sungurra*, in the banks of which coal beds, averaging from five to fifteen feet, are exposed to view alternately on either side for one or two miles distance: there are several descriptions of coal, specimens of all of which I brought away with me.

From this spot I retraced my steps towards the plains, leaving *Tal-*

cher several miles to my left, and passing through a part of the *Ungool* territory : the third day, the 24th, I reached the village of *Nagunna* on banks of the Brahminee, about two miles east of *Nadurra*. There is a very ancient temple here, dedicated to *Nagnath :* the name of the village is a corruption of this title. There is an inscription round the lingum placed within the temple which is very small. I was not permitted to see it, and was informed that the greater part of it was obliterated.

From *Nagunna* I proceeded the following morning to *Chundeepal*, a village surrounded with the richest cultivation, and close on the banks of the river, on the alluvial deposits of which there is extensive tobacco cultivation ; it supplies the markets of *Cuttack*, *Budruck*, and *Balasore*.

My next march was to the large town of *Kasseepur*, likewise on the banks of the river : the cultivation is equally good. Many merchants reside here ; their trade is in timber, cotton, tobacco, oil seed, and other products of the forests. I remained during the heat of the day at this place, and in the evening proceeded by dawk towards Calcutta. I arrived on the fourth day after having travelled no less than miles from the 23rd of February to the 30th of March. I however feel amply repaid for the fatigue endured, first, from having been enabled to reinspect the *Dhauli* inscriptions ; and, secondly, in having been so fortunate as to discover such extensive fields of coal, above which iron ore is equally plentiful. It is to be hoped that the day is not far distant when these valuable minerals may be turned to good account.

Meteorological Register, kept at the Assay Office, Calcutta, for the Month of December. 1838.

Day of the Month.	Forenoon, 10 A. M. Atmospheric Pressure. Old Stand. Barometer.	Height at 32° Fah.	Temperature. River water.	Well water.	Of air.	Dew-point.	Hygrometry. Wet-bulb Depression.	Differential Therm.	Hair Hygrometer.	Aqueous tension. By Dew-point.	By Wet bulb.	By Hair Hygrometer.	Weather. Wind. Direction.	Force.	Aspect of Sky.	Afternoon 4 P. M. Atmospheric Pressure. Old Stand. Barometer.	Height at 32° Fah.	Temperature. Of Air.	Dew-point.	Hygrometry. Wet-bulb Depression.	Differential Therm.	Hair Hygrometer.	Aqueous tension. By Dew-point.	By Wet bulb.	By Hair Hygrometer.	Weather. Rain on roof	Rain on ground.	Wind. Direction.	Force.	Aspect of Sky.
1	30,028	30,012	73,9	77,3	74,5		10,4	10,1	80		50	59	NNw.	3	clear.	29,909	29,889	78,7		12,3	11,3	76		46	52			N. w.	1½	cir.cum.fine
2																														
3	,004	29,985	74,5	77,5	73,3		7,1	7,0	87		65	72	n. w.	2	do.	,888	,864	78,7		12,6	11,7	75		45	51			n. o.	1	cir.cum.fine
4	29,987	,976	74,3	77,2	75,4		9,9	10,0	81		52	61	nn. w.	2	do.	,863	,844	78,7		13,1	11,7	73		43	48			n. o.	1	do. few.
5	,970	,963			73,5		8,1	7,8	85		60	68	NNw.	2	cly.cir. cum.	,885	,860	77,0	56,0	12,2	11,5	76	51	45	52			s. e.	2	cir.do. haze.
6	,992	,983	74,2	77,3	73,3	62,2	7,2	7,3	86	70	65	70	n. e.	1	do.	,908	,884	77,0	55,0	11,9	11,0	76	48	45	52			o.	0	cldy. do.
7	30,026	,915	73,4	76,7	72,9	59,5	7,6	7,5	86	64	62	70	n. w.	1½	cir. cum.	,934	,909	76,8	59,0	11,1	10,4	78	56	50	56			o.	0	do.cir.strat.
8	,009	,999	73,9	77,3	74,1	60,2	8,4	8,1	84	52	60	66	n. w.	1	do. few.	,889	,870	78,3	56,2	11,3	11,0	79	49	50	57			n. e.	0½	cir.cum.f. c.
9																,897	,881	79,5	54,5	13,6	13,0	74	44	41	49			s. e.	1½	clear.
10	29,988	,982	73,6	76,6	73,6	57,2	10,2	10,2	81	58	50	61	s. e.	2½	clear.															
11	30,028	30,019	74,3	77,2	74,7	65,2	4,7	4,7	95	74	75	89	e. n. e.	2	cldy. hazy.	,906	,891	79,3	60,0	8,4	8,4	85	54	62	68			n. e.	1	cir.c.&c. st.
12	29,997	29,995	74,0	76,6	74,7	56,3	9,8	10,1	80	55	54	59	N. o.	1½	cl. overct.	,891	,868	78,5	56,8	12,1	11,4	75	48	46	51			N. w.	1½	overct. cl.
13	,998	,992	73,0	76,1	72,8	56,0	9,6	9,2	80	58	52	59	N. w.	1½	clear.	,860	,841	76,3	53,5	14,5	14,0	67	47	35	40			N. w.	1½	clear.
14	,950	,948	73,7	75,6	71,2	57,2	9,1	9,1	79	63	53	57	n. o.	0½	cir. cum.	,856	,838	76,3	55,0	12,9	12,7	72	50	41	46			s. e.	1½	cir. cum.
15	,988	,983	73,7	75,6	72,3	55,5	9,4	9,0	80	57	52	59	n. e.	1½	clear.	,907	,889	77,1	56,3	11,7	11,1	77	50		53			N. w.	1½	do. few.
16																														
17	30,088	30,090	72,1	75,9	70,2	56,2	9,0	8,3	81	63	53	61	n. w.	0½	clear.	,965	,950	75,2	49,0	14,1	13,0	71	42	47	45			e.n. e.	1	clear.
18	,019	,022	72,2	77,7	69,5	55,7	8,8	8,3	81	63	54	61	n. w.	0½	do.	,911	,906	75,1	49,5	15,0	14,1	69	42	32	42			n. w.	1½	do.
19	,012	,016	72,2	75,8	70,3	56,7	6,8	6,1	88	63	65	74	n. w.	0½	do.	,920	,899	76,3	57,3	12,2	11,7	76	53	44	52			e.	1	cir. cum.
20	,045	,045	71,7	76,3	72,0	59,5	5,7	5,3	93	66	70	84	s. e.	0½	cir. cum. f.	,944	,930	76,9	56,2	13,3	12,5	72	51	40	46			N. o.	1	clear.
21	,053	,053	72,4	75,7	71,7	56,8	6,9	7,1	89	61	65	76	s. e.	1	clear.	,926	,909	77,1		13,8	13,8	71		39	45			S. E.	1½	do.
22	,030	,025	72,5	75,9	73,1	57,0	8,3	8,0	84	59	59	66	n. e.	1½	cumuli.	,928	,908	77,9	53,7	11,2	10,1	79	45	50	57			s. e.	1	cir.cum. hy.
23																,903	,879	79,3	56,0	9,6	9,6	83	47	57	65			s. e.	1½	do. (warm.)
24	29,996	29,990	73,5	77,3	73,5	62,0	3,4	4,2	96	70	82	91	s. e.	2	cly.thk.fog.															
25																,991	,972	78,7	61,0	9,0	7,9	84	57	60	66			o. e.	0½	fine.
26	30,076	30,074			74,1		4,7	4,4	94		75	87	N. o.	1	c. c. overct.															
27	,103	,092			75,0	60,0	8,9	7,1	88	61	57	74	s.	0½	clear.	,989	,967	79,8	56,5	9,9	9,2	83	46	57	65			Lull.	0	clear.
28	,045	,035	73,8	76,	75,7	60,6	7,6	7,3	86	62	64	70	n. e.	1	do.	,918	,894	80,1		10,0	9,1	83		56	65			n. e.	0½	do.
29	,094	,061	73,6	76,	74,8	60,0	6,1	5,9	90	62	70	78	n. o.	1	do.	,976	,948	80,9	56,0	11,8	10,9	78	45	50	56			n. o.	1	do.
30																														
31	,002	29,982	73,9	76,2	76,2	58,5	10,3	10,1	83	56	51	65	s. e.	2	clear.	,869	,844	81,4		14,4	13,3	71		40	45			N. o.	1	clr. (warm.)
Mean.	30,021	30,010	73,3	76,6	73,3	58,6	7,9	7,6	85	61	60	69	Light	1†	very cnable.	,893	,895	78,0	55,	12,0	11,3	76	48	46	53			Light	1†	very.cnable.

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